FINAL

UXO WORK PLAN ADDENDUM

SHORELINE STABILIZATION/GEOTEXTILE TUBE INSTALLATION AT IR SITE 7 - OLD DUPONT DISPOSAL AREA NAVAL WEAPONS STATION YORKTOWN CHEATHAM ANNEX YORKTOWN, VIRGINIA

Prepared For:



Department of the Navy, Mid-Atlantic Division Naval Facilities Engineering Command 6506 Hampton Boulevard Norfolk, Virginia 23508-1278

June 25, 2006

Contract No.: N62470-03-D-4198 Contract Task Order No.: 001 Modifications No. 02 and 03 Bhate Project No.: 9030080

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LIST OF ACRONYMS

AAFES Army and Air Force Exchange Service
AEDA Ammunition Explosives Dangerous Articles

AHA Activity Hazard Analysis

ARAR Applicable, relevant, and appropriate requirement

BATF Bureau of Alcohol, Tobacco, and Firearms

BIP Blow in place CAX Cheatham Annex

CEHNC U.S. Army Engineering and Support Center, Huntsville

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CFR Code of Federal Regulations
CIH Certified Industrial Hygienist
CWM Chemical warfare materiel

DDESB Department of Defense Explosive Safety Board DHHS Department of Human Health and Services

DID's Data Item Descriptions

DMM Demilitarized Military Munitions

DOD Department of Defense

DOT Department of Transportation

DRMO Defense Reutilization Marketing Office

EM Engineering Manual
EMM Earth moving Machinery
EOD Explosives Ordnance Disposal

EODMUTWO Explosive Ordnance Disposal Mobile Unit Two

EP Engineering Pamphlet

EPA Environmental Protection Agency
EPP Environmental Protection Plan

ER Engineer Regulations

ESS Explosives Safety Submission

EZ Exclusion zone

FAR Federal Acquisition Regulation

FT Foot or Feet

GPS Global Positioning System

HTRW Hazardous, Toxic, and Radioactive Waste

IAW In Accordance With

IDW Investigative Derived Waste

MD Munitions Debris
MC Munitions Constituents

MEC Munitions and Explosives of Concern

MGFD Munition with the Greatest Fragmentation Distance
MPPEH Material Potentially Presenting an Explosive Hazard

MRA Munitions Response Area
MRS Munitions Response Site
MSD Minimum Separation Distance
MWR Morale, Welfare, and Recreation

NAVEODTECHDIV Naval Explosive Ordnance Disposal Technical Division

NAVFAC Naval Facilities Engineering Command

LIST OF ACRONYMS (CONTINUED)

NAVSEA Naval Sea Systems Command NCP National Contingency Plan

NEESA Naval Energy and Environmental Support Activity

NIOSH National Institute of Safety and Health

NOSSA Naval Ordnance Safety and Security Activity

NTP Notification to Proceed

NWSY
OB/OD
Open Burn/Open Detonation
OE
Ordnance and explosives
OP
Ordnance Publication
OPNAV
Chief of Naval Operations

OSHA Occupational Safety and Health Administration

PM Project Manager POC Point of Contact

PPE Personal protective equipment
PSI Pounds per square inch
QA Quality Assurance
QC Quality Control

QCM Quality Control Manager
QCP Quality Control Plan
Q-D Quantity-Distance

QRP Qualified Recycling Program
RAB Resident Advisory Board

RCWM Recovered Chemical Warfare Materiels
ROICC Resident Officer In-Charge of Construction

RPM Remedial Project Manager
SSHP Site Safety and Health Plan
SUXOS Senior UXO Supervisor
SRI Southwest Research Institute
TCRA Time-Critical Removal Action

TBD To Be Determined

USACE United States Army Corps of Engineers

USAESCH United States Army Engineering Support Center, Huntsville

USCG United States Coast Guard

USEPA United States Environmental Protection Agency

UXO Unexploded Ordnance

UXOQCS Unexploded Ordnance Quality Control Specialist

UXOSO Unexploded Ordnance Safety Officer

WP Work Plan

1 INTRODUCTION

1.1 General Information

Bhate Environmental Associates, Inc., (Bhate) has been retained by the Department of the Navy, Naval Facilities Engineering Command (NAVFAC), Norfolk, Virginia, under Contract No. N62470-03-D-4198, Contract Task Order No. 001 (CTO #001), Modification (Mod) 02 and 03 to perform a Time-Critical Removal Action (TCRA) at Site 7, Naval Weapons Station Yorktown (NWSY), Cheatham Annex (CAX), located in Yorktown, Virginia.

This Unexploded Ordnance (UXO) Work Plan (WP) is the basic WP for the TCRA of the shoreline stabilization of Site 7 concerning remediation of MEC. It will be used to guide the performance of munitions and explosives of concern (MEC) remediation operations. It provides the technical basis for locating, identifying, and disposing of MEC material while excavating debris that could penetrate the geotextile tubes and geomembrane and any MEC material at Site 7.

This WP incorporates the guidance and requirements of Naval Ordnance Safety and Security Activity (NOSSA) Instruction 8020.15, Chief of Naval Operations (OPNAV) Instruction 3500.27A, Naval Sea Systems Command (NAVSEA) Ordnance Publication (OP) 5, appropriate elements of the U.S. Army Corps of Engineers (USACE) Engineering Pamphlet (EP) 75-1-2, EP 1110-1-18, and 385-1-95a, Explosive Safety Submission Shoreline Stabilization/Geotextile Tube Installation at IR Site 7 – Old DuPont Disposal Area, Bhate dated December 2005 and appropriate elements of the U.S. Army Corps of Engineer (USACE) Ordnance and Explosives (OE) Data Item Descriptions (DID's). The UXO WP addresses the standard operating procedures to be used by all Bhate personnel to minimize the risk from MEC hazards. The procedures for conducting the MEC remediation are detailed in the following sections of this plan.

The Environmental Protection Plan in Section 6 of the Final Work Plan, Site 1 - Landfill Near Incinerator, Naval Weapons Station Yorktown, Cheatham Annex, Yorktown, Virginia (Bhate, 2003) is applicable to Site 7 and is incorporated by reference. In addition, Bhate does not expect to encounter any situation where investigative derived waste (IDW) would be generated; therefore, an IDW Plan is not required.

1.2 Regulatory and Technical Requirements

MEC support activities shall be conducted in full compliance with NAVSEA and Department of Defense (DOD) requirements regarding personnel, equipment, and procedures. All MEC operations shall be performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP).

The provisions of Title 29 of the Code of Federal Regulations (CFR) Section 1910.120 (29 CFR §1910.120) shall apply to all MEC related activities accomplished at this site. In addition, due to the inherent risk in MEC operations, the contractor shall be limited to 40 hours of MEC related tasks during the workweek (either four 10-hour days or five 8-hour days). Two consecutive workweeks shall be separated by 48 hours of rest. UXO personnel shall not perform MEC-related tasks for more than 10 hours per day.

1.3 Site Location

The size of Site 7, the Old DuPont Disposal Area, is unknown as there have been very limited investigations of the site. The Final Trenching and Limited Field Investigation Report Site 7N, (Baker, 2004) stated that the size of the waste area is estimated to be approximately 7,500 square feet. This area is estimated because the north and west waste boundary edges are unknown. Additionally, this estimate did not include any of the debris littering the beach. The site encompasses Morale, Welfare, and Recreation (MWR) Cabins 169 and 170 along the York River and Davis Road, which have since been closed to campers due to the erosion of the shoreline area. The site is bordered by the York River to the east and Chase Road to the west. Several occupied MWR cabins are located west of Chase Road approximately 300 feet from the site and two MWR administrative buildings (262 and 264) are located approximately 400 feet northwest of the site. Several warehouses are located approximately 700 feet southwest of the site. An Army and Air Force Exchange Service (AAFES) gas station is located approximately 3,687 feet (0.70 miles) south-southeast of the site. This property is owned by the U.S. Navy and there are no plans to relinquish it to another organization. Figure 1-1 in Appendix B shows the location of CAX Site 7.

1.4 Site History

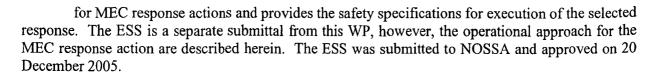
The proposed TCRA at Site 7 addresses only shoreline stabilization and not the removal of MEC. The eastern slope of the disposal area along the York River will be stabilized to prevent further erosion of Site 7 contents into the York River. Shoreline stabilization will include the installation of sand-filled geotextile tubes and grading of the eroded slope. The geotextile tubes will be placed against the toe of the eroding slope and will protect approximately a 240 foot length of the shoreline and is shown in Figure 1-2 in Appendix B.

In February 2004, trenching activities were conducted in support of a proposed TCRA at Site 7 and a total of 14 trenches were dug ranging from 1 to 6 feet in depth and 7 to 14 feet in length until native soil was encountered. The trenching activity at the site revealed a variety of debris types including glass bottles, large pieces of stoneware, bricks, ash, concrete rubble, and metal. During trenching tests, no munitions were observed within the surface or subsurface soil.

In March and April 2004, soil samples were collected in support of a proposed TCRA at Site 7. Analytical results indicated the following contaminants of concern; pesticide compounds (4,4'-DDE, alpha-BHC, beta-DHC, alpha-chlordane, and heptachlor epoxide), lead, barium, copper, zinc, arsenic, and mercury.

On June 9, 2004, a 3-inch diameter projectile was found on the beach of the York River, below Site 7. The projectile was removed from the site and disposed of by Naval Weapons Station Yorktown Explosive Ordnance Disposal Mobile Unit Two (EODMUTWO). The projectile was severely corroded and appeared to be unfired and unfuzed. Evidence following disposal was inconclusive as to whether the projectile was explosive or inert filled. The projectile was very similar to the 3" Stokes Mortar and was the ordnance item used for the calculation of the minimum separation distance determinations for this WP. The origin of this single item is unknown.

The Navy directed Bhate to prepare an Explosives Safety Submission (ESS) in accordance with NOSSA Instruction 8020.15. An approved ESS is required before conducting ground disturbance or intrusive activities in areas known or suspected to contain MEC. The ESS is a planning document



1.5 Topography

The topography of the majority of Site 7 is relatively flat with elevations around 21 feet above mean sea level. The topography approximately 40 feet to the east of the cabins slopes sharply down towards the York River. The elevation at the bottom of the slope along the York River ranges between 4 to 0 feet above mean sea level. The depth of the frost line at the site is approximately 16 inches.

1.6 Climate

The climate is typically four season's with the temperature reaching the mid 90's during the summer months.

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2 TECHNICAL MANAGEMENT PLAN

This Technical Management Plan is prepared for NWSY and NAVFAC Mid-Atlantic Division to describe MEC removal from Site 7. All activities involving work in areas potentially containing MEC hazards will be conducted in full compliance with U.S Navy guidance and DOD requirements regarding personnel, equipment, and procedures. All actions taking place at this site will comply with 29 CFR §1910.120. All site operations will be in accordance with the Site 7N – Old DuPont Disposal Area, Shoreline Stabilization Project, Cheatham Annex, Naval Weapons Station Yorktown, Yorktown, Virginia Scope of Work, dated July 2, 2004, and the Munitions Response Actions to Support Geotextile Installation at the Old DuPont Disposal Area, dated December 5, 2005. The Site Safety and Health Plan (SSHP) Addendum for the MEC remediation effort is located in Appendix D of this WP.

The objective of this project is to perform a TCRA of all MEC material located within Site 7. Once this action is complete the installation of shoreline stabilization materials may continue. All site operations shall be performed in compliance with CERCLA. Therefore, the administrative requirements of federal, state, or local permits are not required for implementation of any MEC procedures, including onsite destruction of MEC.

All site workers will adhere with this UXO WP during MEC remedial excavation operations. The UXO procedures will be implemented to assist in site worker safety if any MEC is excavated and assist in delineating the best method that the UXO Technicians will use to eliminate the immediate hazard and neutralize the MEC encountered. A fully qualified UXO Team will conduct the excavation and debris removal activities on site and conduct a visual and magnetometer search to locate anomalies and determine if MEC is present. If MEC or Material Potentially Presenting an Explosive Hazard (MPPEH) is encountered, it will be positively identified and determined to be inert by the Senior UXO Supervisor (SUXOS) team member before it can be considered "safe to move". Procedures in Appendix E of this WP, MEC Demolition Standard Operating Procedures will be followed.

2.1 Chemical Warfare Materiel

There has been no evidence of chemical warfare materiel (CWM) being stored, tested, disposed of or existing within the area comprising this project. Therefore, air monitoring is not warranted during this effort. However, if onsite UXO personnel suspect that an excavated anomaly is a potential CWM item, the following procedures will be implemented:

- 1. Work will immediately stop and all workers will leave the area and go to an upwind location.
- 2. The onsite UXO Technician will contact the SUXOS for confirmation.
- 3. The SUXOS will notify the Bhate representative on-site who will in turn notify the CAX onsite Safety Specialist, or the NOSSA MEC specialist. The CAX Safety Specialist will notify the EODMUTWO Team for immediate response.
- 4. The Bhate project manager will call the Resident Officer In-Charge of Construction (ROICC) point of contact (POC), NAVFAC Mid-Atlantic Remedial Project Manager (RPM), and the NWSY Environmental Office POC to inform them that a potential CWM item has been discovered.

5. Onsite UXO Technicians will secure the site and post two UXO Technicians to guard the area until direction is received from NOSSA or military Explosives Ordnance Disposal (EOD) arrives to take control of the incident. Bhate will stand-by ready to support the Navy as required.

2.2 MEC Disposal

All MEC found, unearthed, or exposed during remedial activities will be positively identified and quantified. When MEC is recovered and the SUXOS makes the determination that it is safe to move, the item will be transported to the Open Burn/Open Detonation (OB/OD) range at the NWSY for immediate treatment and disposal. This range location is shown in Figures 2-1 and 2-2 in Appendix B. The current operating procedures for the OB/OD range at the NWSY will be used to conduct the disposal operations and the Yorktown EODMUTWO team will assist Bhate personnel in a limited capacity, such as radio communication with NWSY Fire Department and Law Enforcement Officials. MEC items that are shipped over public highways will be transported in accordance with 49 CFR Part 177 and NAVSEA SW020-AG-SAF-010, Navy Transportation Safety Handbook for Ammunition, Explosives, & Related Hazardous Materials.

2.2.1 Coordination and Supervision

Any on-site disposal or disposal at the Yorktown Disposal Range will be under the direct control of Bhate. Bhate personnel and appropriate subcontractors will assist the Demolition Contractor in the disposal of all MEC encountered. Bhate will fully brief all on-site personnel as to the identification of the MEC, quantities, and the condition of the MEC.

2.2.2 Evacuation and Site Control

Site control of the disposal area when on-site disposal is required will be under the direct control of Bhate employees. When a disposal is conducted on the Yorktown Disposal Range the direct control will be an effort between Bhate employees and the Yorktown EOD Unit.

Disposal site control will be the responsibility of Bhate. Any evacuation required will be a joint effort between Bhate, CAX, and NWSY security. Refer to section 2.12 of this document for the distances required to be evacuated by nonessential personnel. Any inhabited buildings that are within the evacuation distance will require evacuation while MEC excavation is in progress.

2.3 Technical Scope of Work

Bhate will perform an MEC remediation of the area where the geotextile tubes and the geomembrane will be constructed. This will entail performing a surface sweep of the area prior to mobilization of equipment onto the site, removal of subsurface munitions and munitions debris by excavating the area to an approximate depth of 1 foot to 4 feet using earth moving machinery (EMM), and conducting magnetic location/dig procedures on two transect strips located within 25 feet of the low tidal area.

2.4 Mobilization

Bhate will perform operations in a systematic manner using proven and effective operating techniques and methods. Bhate will begin mobilization following written approval of this WP and

receipt of notification to proceed (NTP) from the NAVFAC Mid-Atlantic ROICC. Bhate will systematically build and establish its operational capability at CAX Site 7. The objective of this phase is to ensure that proper attention is dedicated to coordinating with the customer and moving to the operational phase as soon as practical. Actions performed during this phase include:

- 1. Identify/procure, package, ship, and inventory project equipment.
- 2. Coordinate with local sources for communications and other support.
- 3. Finalize operating schedules.

Due to the limited amount of equipment required for this effort, storage of site equipment and administrative duties will be performed at a small field trailer outside the exclusion area of Site 7.

2.5 MEC Surface and Subsurface Investigations

2.5.1 Surface Investigation

A visual surface clearance will be performed by the UXO Team before the identified area is excavated and screened by EMM.

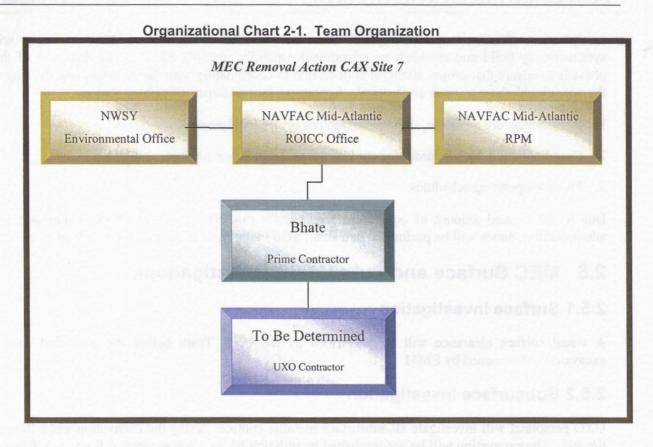
2.5.2 Subsurface Investigation

UXO personnel will investigate all subsurface metallic contacts during the excavation and sifting of the soil. The excavation will be accomplished by utilizing EMM. Soil excavated from each disposal pit will be mechanically screened. EMM identified for this task is armored to USACE specifications to ensure operator protection from unintentional detonation.

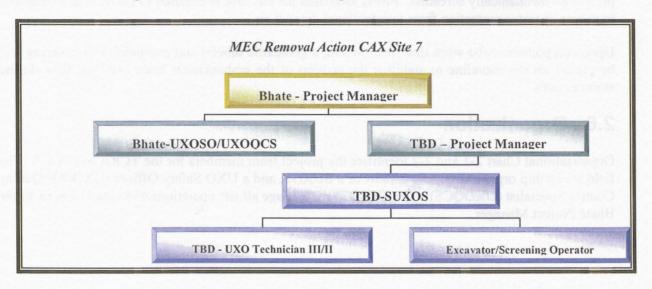
Upon completion of the work described herein, a geotextile tube(s) and geomembrane covering will be placed on the shoreline to stabilize the erosion of the embankment from overland flow during storm events.

2.6 Organization

Organizational Chart 2-1 and 2-2 identifies the project team members for the TCRA of CAX 7. The field leadership organization will consist of a SUXOS, and a UXO Safety Officer (UXOSO)/Quality Control Specialist (UXOQCS). The SUXOS will manage all site operations and report directly to the Bhate Project Manager.



Organizational Chart 2-2. Field Operations Organization



2.7 UXO Personnel and Qualifications

As required by EP 75-1-2a and OP 5, UXO technicians working on Site 7 will meet Department of Defense Explosive Safety Board (DDESB) Technical Paper 18, *Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel*, dated 20 December 2004. The

qualifications of the UXO Technicians working on this site will be provided to the NAVFAC Mid-Atlantic RPM and ROICC POC prior to their commencing work.

Non-UXO qualified personnel will not perform any hand excavations nor handle MEC. As required by the specific task, all Bhate personnel on this project will complete the Occupational Safety and Health Administration (OSHA) 40-hour training course for hazardous waste operations and emergency response site workers and will have taken an annual 8-hour refresher course, as necessary. Additional site specific training, in accordance with 29 CFR §1910.120, USACE Engineer Manual (EM) 385-1-1, Safety and Health Requirements, and USACE Engineer Regulations (ER) 385-1-92, Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) and Activities, will be provided to all personnel upon their initial mobilization. A Medical Surveillance Program will be in place with the latest exam within the last 12 months. Table 2-1 below details additional UXO personnel training requirements.

Training/Certification	Required Personnel			
40-Hour Hazardous Materials Workers Training (HAZWOPER)	All personnel who have not previously received this training or who do not qualify for certification through documented experience or training equivalent to that in paragraphs (e)(1) through (e)(4) of 29 CFR §1910.120. (Reference: Paragraph (e)(9) 29 CFR §1910.120).			
8-Hour Supervisor Course	All Bhate management and supervisory personnel. This includes the Site-Safety Officers, Senior UXO Supervisors, Quality Control Specialists, and all SUXOSs.			
8-Hour Refresher Course	All site personnel, except those that have completed their initial 40-Hour HAZWOPER training within the past 1-year.			

Table 2-1 Personnel Training

2.8 Site Specific Training

As part of the mobilization process, Bhate will perform site-specific training for all personnel assigned to this project. The purpose of this training is to ensure that all personnel fully understand the procedures and methods Bhate will use to perform operations at CAX Site 7, their individual duties and responsibilities, and all safety and environmental practices/procedures associated with operations. All personnel involved in the execution of this task order will be trained upon their mobilization to the site. Training topics/issues and training responsibilities are as follows:

- 1. Prior to deployment, the SUXOS will receive an operational brief from the project manager on his duties and responsibilities, and will review the work and safety plans relating to this project.
- 2. Prior to the start of operations, Bhate and subcontractors will receive ordnance recognition and UXO safety precautions training. This training will be performed by the SUXOS.

- 3. Personnel will receive training on the individual equipment they will operate while on-site. This training will be provided by Bhate or the subcontractors equipment personnel.
- 4. Prior to mobilization, Bhate will ensure that UXO personnel have received HAZWOPER 40 hours (or eight hour refresher) training, as required.

All personnel on site will have completed a pre-placement or annual physical examination. The examination complies with the requirements of 29 CFR §1910.120 and all personnel have been certified as fit to work by an Occupational Physician certified in Occupational Medicine by the American Board of Preventive Medicine, or who by necessary training and experience is board eligible. All Bhate personnel and subcontractors on-site are in the Bhate medical surveillance program or respective medical surveillance program. Medical qualification documentation of all personnel will be on file at the site or at the respective Bhate Office and provided to the contracting officer upon request.

2.9 General Site Practices

All MEC activities will be performed under the supervision and direction of qualified UXO personnel. Non-UXO qualified personnel will be prohibited from performing operations unless they are accompanied and supervised by a UXO Technician. Throughout operations, Bhate will strictly adhere to the following general practices. Detailed safety precautions and procedures for explosive disposal operations are located in Appendix E and Appendix F of this WP.

2.9.1 Work Hours

Specific work schedules will be coordinated with the demolition handler contractors and transporters in order to ensure emergency support is available during working hours. MEC associated activities will be conducted during daylight hours only. UXO Personnel will work no more than 10 hours per day and no more than 50 hours per week and at no time exceed more than 8 hours a day or 40 hours per week of explosive operations

2.9.2 Site Access

Bhate will control access into Site 7 and will limit access to only those personnel necessary to accomplish the specific operations or who have a specific purpose and authorization to be on the site. No hazardous operations will be conducted when unauthorized persons are in the vicinity.

2.9.3 Handling of MEC

Non-UXO personnel will be emphatically instructed and closely supervised to ensure they do not handle any MEC. MPPEH will not be handled or touched unless it has first been checked by a UXO Technician and certified free from explosive material.

--THIS POLICY WILL BE STRICTLY ENFORCED—

2.9.4 Safety Training/Briefing

Bhate will conduct two distinct safety meetings and briefings:

- 1. Daily general briefing conducted by the UXOSO and the SUXOS.
- 2. Daily tailgate safety briefing conducted by the SUXOS.

In addition, the UXOSO may hold a safety stand-down at any time he/she notes any degradation of safety or a safety issue that warrants a review.

2.9.4.1 Daily General Briefing

A Daily General Briefing will be conducted for all personnel at the site prior to beginning work. A written record of this training and the signatures of personnel attending the training will be maintained. The briefing will cover general hazards for the project and any new safety issues or hazards that were identified since the last briefing. This briefing will be conducted by the SUXOS and documented on the Bhate Safety Meeting/Training Record located in Appendix A of this WP.

2.9.4.2 Daily Tailgate Briefing

The SUXOS or the UXO Technician III will conduct tailgate safety briefings. The training will focus on the specific hazards anticipated at each work site during that day's operations and the safety measures that will be used to eliminate or mitigate those hazards. It will also refer to other operations within the area whose proximity may have safety ramifications. As work progresses and team locations change within a site, or from site-to-site, any corresponding changes in ingress/egress routes and emergency evacuation routes will also be reviewed during this tailgate briefing and documented on the Bhate Tailgate Safety Briefing form located in Appendix A of this WP.

2.9.4.3 Visitor Safety Briefing

Site visitors will receive a safety briefing prior to entering the operating area and must be escorted at all times by a UXO qualified person. All visitors entering the site must sign the Bhate *Visitors Log* located in Appendix A of this WP.

2.9.4.4 Safety Violations

Safety violations or unsafe acts will be immediately reported to the SUXOS and the UXOSO. Failure to comply with safety rules/regulations or failure to report violations may result in immediate termination of employment. Safety violations will be recorded using the Bhate *Daily Quality Control Report* form located in Appendix A of this WP.

2.9.4.5 Work Clothing and Field Sanitation

Work clothing will be appropriate for the conditions encountered. In most cases this will be Level D Personal Protective Equipment (PPE).

- 1. Short or long sleeve cotton coveralls or work clothing will be worn.
- 2. Footwear will be sturdy work boots or rubber boots as appropriate (i.e., lug sole and of sufficient height for ankle support). UXO personnel will not wear steel-toe safety boots when using handheld magnetometers.
- 3. Hand protection will consist of leather or canvas work gloves. Rubber inner or outer gloves may be required where increased protection is needed.

- 4. Safety glasses, face shields, respirators, hearing protection, hard hats, and protective chaps or aprons are available and worn when engaged in activities where their use is prudent or required.
- 5. Under no circumstances will tennis/running shoes or abbreviated attire such as tank tops or shorts be permitted.

The team will be outfitted with field sanitation equipment, which will consist of containers of wash water, paper towels, and soap. Prior to commencing operations each day, these facilities will be in place and ready for use in the vicinity of the work area as needed. Good housekeeping and decontamination measures will be practiced.

2.9.5 Compliance with Plans and Procedures

Bhate will conduct operations at CAX Site 7 in a systematic manner coordinated with the on-site management. All MEC activities will be conducted under the direction, supervision, and observation of the SUXOS. All personnel will strictly adhere to approved plans and established procedures highlighted in this document, the ESS, and all pertaining addendums, attachments, and appendices. When operational parameters change and there is a corresponding requirement to change procedures or routine operations, careful evaluation of such changes will be conducted by on-site supervisory personnel. Any new course of action or desired change in procedures will be submitted with justification for approval as required to the appropriate authorities. Approved changes will be implemented in a manner that will ensure uniformity in procedures and end-product quality on the part of the UXO Team. Evaluation of the changes will include any major changes required to the ESS.

2.10 Area Preparation

Area preparation includes the reduction and/or removal of vegetation that may impede or limit the effectiveness of subsurface clearance actions. Vegetation reduction/removal will be accomplished through manual removal and/or mechanical removal. Area preparation will include the felling of trees and brush removal. No stump removal will occur during the area preparation. UXO qualified personnel following procedures described in EP 75-1-2 will accompany the area preparation teams working in areas not previously surveyed for the presence and avoidance of MEC.

2.11 MEC Remediation Footprint

The UXO team will physically preview the actual disposal area footprint with onsite management and discuss visual observations and potential areas of concern. In the event MEC is discovered, the UXO Team will place flagging adjacent to the discovery for subsequent visual reference, select a course around the item, and lead project personnel out of the area.

2.11.1 Personnel

Two UXO Teams will be mobilized for this effort. The UXO Teams will consist of one SUXOS, two UXO Technician's III, and two UXO Technician's II. Also, the Bhate UXOSO/UXOQCS will be on site at all times.

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2.11.2 Location Surveys and Mapping

Any MEC items found out side of the disposal pit area footprints during the remediation activities will be located minimally with a handheld Global Positioning System (GPS) unit, with positional capabilities to the closest 10 meters. Coordinates of all MEC items will be recorded in the Bhate Daily Operation's Summary report located in Appendix A of this WP.

2.11.3 Marking of Items

Bhate will mark, identify, and document all MEC located or encountered. Table 2-2 identifies color codes for the different types of items that may be encountered.

ColorUsed to MarkDouble Crossed Red Pin FlagsMEC (or subsurface anomalies)Yellow Pin FlagNon-Hazardous ScrapWhite and/or Blue Pin FlagBoundary or Temporary Marker

Table 2-2. Marking Materials

2.11.4 Equipment

UXO personnel will utilize hand held magnetometers and metal detectors during the performance of this effort. Additionally EMM will be utilized for the excavation, screening, and removal of soils from each area. The equipment requirements for this activity include:

- 1. Schonstedt GA-52CX, and/or the MK 26 Ferrous Ordnance Locator instruments that will be used to assist in surface sweep activities in and around brush.
- 2. Assorted colored pin flags that will be used to mark boundaries, MEC, and anomaly locations (See Table 2-2).
- 3. Miscellaneous common hand tools (i.e. shovels, trowels, hammers, screwdrivers, etc.).
- 4. Forms and logbooks to record activities and contamination levels.
- 5. Large backhoe.
- 6. Grizzly Soil Sifting Machine or equivalent.

2.12 Minimum Safe Separation Distances

The safe separation distances for the public during intrusive operations will be the Minimum Separation Distance (MSD) based on DOD 6055.9-STD Table C5.T1 or as calculated by United States Army Engineering Support Center, Huntsville (USAESCH) Directorate, Structural Branch for the Munition with the Greatest Fragmentation Distance (MGFD) in accordance with (IAW) OP 5. If conditions dictate, with the approval of the Navy, the MSD may be reduced to fit the situation, but in no case will the distance be less than 1/600 foot (ft), the K40 based on overpressure, or 200 ft minimum, which ever is greater. Table 2-3 shows the MGFD and MSD for the MEC that is most similar to the 3-inch projectile that was found at the site. See Appendix H of this WP for the DDESB

MSD Fragmentation Data Review Form for the 3-inch Stokes mortar and Appendix B of this WP for maps illustrating the appropriate MSDs.

Table 2-3. Minimum Separation Distances (MSDs)

				(feet)	Company of the State of the
The state of the s		*For Unintention	onal Detonation	For Intention	al Detonation
Location	MGFD MEC	Maximum Fragmentation Distance (1/600)	K40 Range to 0:09 Overpressure (feet)	Without Engineering Controls	Using Sandbag Mitigation
CAX Site 7	3-inch projectile	219	54	1,346	200

Note: 1. See Appendix H for calculation sheets and documentation of MSD and Appendix B for a detailed Map.

*UXO Team separation distance for unintentional detonations is the K40, or 200 feet minimum whichever is greater. The Maximum fragmentation distance will be used for all non-essential personnel.

2.13 Earth Moving Machinery Operator Protection

The large backhoe's operator compartment will be armored IAW Table 2-4, Table of Comparison for Minimum Thickness to Prevent Perforation, which meets the requirements of the DOD 6055.9-STD, DOD Ammunition and Explosive Safety Standards, dated October 5, 2004, and DDESB Technical Paper 16, Methodologies for Calculating Primary Fragment Characteristics, dated December 1, 2003, for minimum thickness to prevent injury to the backhoe operator.

Table 2-4. Table of Comparison for Minimum Thickness to Prevent Perforation

Material	DDESB Standard (inches)
Mild Steel	0.68
Hard Steel	0.56
Plexi-Glass	2.87

2.14 Records

The SUXOS will prepare and maintain a detailed accounting of activities performed at each grid. Grids are explained in Section 3 of this document and are used to ensure accurate coverage of the excavation efforts and also for recording the location of any MEC that may be uncovered on this site. The *Daily Operations Summary* located in Appendix A of this WP will include information pertaining to the following.

- The date and time operations began.
- The date and time operations were completed.
- The number of hours, by labor category, expended in performing operations.
- The location, number, type, and description of MEC items encountered.

- An estimated weight, in pounds, of the MPPEH, and/or discarded military munitions (DMM), removed that day.
- The location of all MEC items as recorded by a handheld GPS.

In addition, while on site, the SUXOS will maintain a Daily Log of combined site activities and will provide the USACE with a weekly summary of all site operations.

2.15 Removal and Disposal of Scrap Metal, Munitions Debris, or Demilitarized Military Munitions

Within or adjacent to each operating area, the UXO Team will establish temporary scrap collection points. During operations, metal scrap will be inspected by both UXO Team technicians and segregated into two categories:

- Trash (i.e. nails, wire, tin cans, etc.)
- Munitions Debris (MD) or DMM free of explosive hazards (i.e. fragmentation shrapnel and ordnance components)

Upon completion of daily operations, the team will collect the material in these temporary collection points and take them to the scrap holding area. The scrap holding area will have a lockable container for MD and DMM certified free from explosives. As the MD or DMM material is being loaded into the containers, the UXOSO and SUXOS will perform a second inspection of the material to ensure it is segregated correctly.

2.15.1 Responsibilities

2.15.1.1 SUXOS

The responsibilities of the SUXOS include:

- Ensuring quality field methods are employed.
- Conducting daily audits of the scrap metal handling process.
- Checking, classifying, and segregating all scrap as they recover it.
- Re-inspecting all scrap as it is loaded for transport to the scrap holding area.
- Randomly inspecting and documenting a minimum of 10% of the scrap being processed to insured the handling procedures are being followed.

2.15.1.2 **UXOSO/UXOQCS**

The UXOSO/UXOOCS will:

- Ensure that specific procedures for scrap metal processing are being followed, performed safely, consistent with applicable regulations, and in accordance the project WP.
- Perform random checks to ensure all scrap is being handled correctly.
- Certify that all scrap metal is free from explosive hazards.

2.15.1.3 UXO Technician III

In addition to the tasks performed by a UXO Technician II (listed below), a UXO Technician II will:

- Supervise and perform on-site demilitarization of MEC, and handling of demolition explosives.
- Conduct daily site safety briefings.
- Supervise the conduct of all on-site MEC-related operations.
- Inspect and certify and/or verify MPPEH as safe or as to the explosive hazard it may present for transfer within the DOD or release from DOD control per current policies and standards.

2.15.1.4 UXO Technician II

The UXO Technician II will:

- Properly store explosive materials per applicable guidance.
- Determine precise location in field environment using a variety of techniques such as GPS equipment, or basic land navigation techniques using a map and compass.
- Prepare an on-site holding area to temporarily stow MEC that has an acceptable risk of movement.
- Operate modes of transportation for transporting MEC, for which the risk of movement has been determined acceptable, when appropriate.
- Escort personnel who are not directly involved in MEC-related operations (e.g. personnel performing environmental monitoring), but have activities to perform within the exclusion zone.
- Inspect MPPEH for the presence of explosives safety hazards.
- Reconnoiter and classify MEC and DMM.
- Identify all types of military munitions, including possible fuzes and their condition, armed or unarmed. Examples of these military munitions are:
 - Bombs
 - Guided missiles
 - Projectiles
 - Rockets
 - Land mines and associated components
 - Pyrotechnic items
 - Military explosives and demolition materials
 - Grenades
 - Submunitions
- Excavate subsurface MEC and DMM.
- Move and/or consolidate MEC and DMM that has been determined acceptable for movement within a Munitions Response Site (MRS) or Munitions Response Area (MRA), but not over public traffic routes.
- Transport demolition materials and/or MEC and DMM that have been determined safe for transport over public traffic routes, when required.

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- Prepare firing systems, both electric and non-electric, for demilitarization operations.
- Assist in the inspection of MPPEH for the presence of explosive hazards.
- Construct MEC-related protective works.

A documented description of each container will be provided for the disposal facility with the following: contents, weight, location where scrap was obtained, name of contractor, names of certifying and verifying individuals, container identification number and seal identification.

2.15.2 Certification and Verification of Scrap Material

Within or adjacent to the site, the UXO Team will establish temporary small arms and scrap collection points. During operations, items that are free of explosive contamination will be placed into these collection points. MEC or MPPEH items that require venting to determine if they are explosives free will be included in demolition operations to be performed by Bhate and their subcontractor on the day they are found or the next available day. Upon completion of daily operations in that disposal pit area, the material in these temporary collection points will be collected and a second inspection will take place. MPPEH that is determined free from explosives will be annotated in the *Daily Operations Summary* by the SUXOS and include a description of the material that is free from explosives.

The SUXOS and the UXOSO will certify and the Naval Explosive Ordnance Disposal Technical Division Explosive Safety Officer from Indian Head, Maryland will perform a third inspection which will meet the requirements of DOD Instruction 4140.62, *Management and Disposition of Material Potentially Presenting an Explosive Hazard (MPPEH)*, dated 3 December 2004, paragraph 6.2.1, requiring an independent 100% inspection, verifying that the MD or DMM is free of explosives hazards.

A DD Form 1348-1A will be used as the certification/verification documentation and will state the following:

- Basic material content.
- Estimated weight.
- Unique identification/seal numbers for each container.
- Location where scrap was obtained.

The following certification/verification will be entered on the DD 1348-1A and be signed by the SUXOS and UXOSO/UXOQCS.

"This certifies that the AEDA [Ammunition Explosives Dangerous Articles] residue, Range Residue, and/or Explosively Contaminated Property listed has been 100 percent properly inspected and to the best of our knowledge and belief are inert and/or free of explosives or related materials."

All MD or DMM will be transferred to the nearest Defense Reutilization Marketing Office (DRMO) or Public Auto Parts and Scrap, Inc., 2050 W. Pembroke Avenue, Hampton, Virginia (23661). In the event that a DRMO is not available or will not accept MEC Related scrap, and the military installation will not accept the military debris, then Bhate will transport all debris to a local foundry and/or recycler for processing through a smelter, shredder or furnace prior to resale or release. Bhate

will track the material from the time of recovery through the disposal process and will include this documentation in the Final Report.

2.16 Reports and Documentation

2.16.1 Monthly Reports

Bhate will submit a monthly status report to the Navy. This report will contain a compilation of all data pertaining to the site, man-hours, and any other pertinent information.

2.16.2 Final Closeout Report

Throughout the execution of this task order, Bhate will collect data that will be incorporated into the final report, and will prepare Weekly Reports as operations are completed at the site. During demobilization, this data will be assembled for inclusion in the final report for this task order. Bhate will submit a Draft Closeout Report within 30 days after fieldwork is completed. A Final Report shall be submitted within 15 calendar days after receipt of comments from the Contracting Officer. The Draft Closeout Report will contain, as a minimum:

- All survey and mapping data.
- Detailed accounting of all disposed MEC related materials.
- Daily journals of all activities associated with the job site.
- Salvage material turn-in documentation.
- Quality Control documentation.
- Color photographs depicting major action items and MEC discoveries.
- Major problems or issues encountered with supporting documentation if available.

2.17 Demobilization

During this phase, Bhate removes its operational capability from the area and reallocates its personnel and equipment to other projects. Bhate's Project Manager will closely monitor operational performance throughout the execution of this task order. When a clear projection can be made of the actual completion date, the Project Manager will, with the approval of the NAVFAC Mid-Atlantic ROICC POC, initiate actions to demobilize personnel and equipment.

Following the completion of operations, Bhate's Project Manager will take action to close all accounts with local vendors and suppliers. Final billing for these accounts will be forwarded to Bhate's accounting department in Birmingham, Alabama.

During demobilization, Bhate will remove or return to the government all facilities and equipment used to support this project. Government furnished equipment, if used, will be returned in a clean and maintained condition. Equipment will be removed as follows:

• If used, Bhate will coordinate the turn-in and shipment of all government furnished equipment with NWSY Property Management Branch.

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• Bhate will remove all of its operating equipment associated with this MEC Remediation from CAX. The equipment, in a clean and maintained condition, will either be returned to Bhate or shipped to another project.

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3 RESPONSE TECHNIQUE

Bhate will perform an MEC remediation of the area where the geotextile tubes and the geomembrane will be constructed. The total area to remediate will include two distinct areas. The first area will be referred to as the upland area which is 25 feet east of buildings 169 and 170 and down the slope of the embankment to about 10 feet from the approximate high tide line of the York River. The second area will be referred to as the shoreline area which is 10 feet from the approximate high tide line to about 25 feet east towards the York River. Both areas are 250 feet long to accommodate the installation of the shoreline stabilization material. Both the north and south end of the total length will be extended by 20 feet for remediation purposes to assure that all MEC material is cleared from the area that the installation crew will be working.

The UXO Teams will conduct a surface sweep of both the upland and shoreline area before any EMM or mag/dig operations are conducted. The surface sweep will be conducted in an orderly fashion where the UXO Technicians will line up approximately at arms length and walk in straight line while looking for any MEC material that may be on the surface. A hand held magnetometer will be used to search within areas that the UXO Teams will not be able to see clearly, such as under shrubs and bushes. After the surface sweep is conducted, the team will prepare the site for subsurface excavation.

Prior to any of the MEC remediation, a shrub clearing team will remove identified shrub and trees from the area to be cleared. All tree trunks will remain in the ground and only be removed by the backhoe during the upland excavation operations. Each tree trunk will be inspected using a hand held magnetometer to ensure no ferrous material made its way into the tree during growth. A UXO Team will stand by during the shrub clearing efforts to assist in the event that MEC material is found.

The upland area will be cleared using a large backhoe that will remove all the debris, facilitating the installation of the shoreline stabilization material, and removing any MEC material that may be found under the surface, to a depth of approximately 4 ft. All of the soil and debris excavated will be placed onto a conveyor belt feed screening machine utilizing a 2-inch screen. In the event that a 2-inch screen is insufficient for the operation, the SUXOS can authorize an increase or decrease in the screen size if necessary.

The UXO Technician will operate the screening machine from a distance greater than what is required for a K-factor value of K24, IAW DDESB 6055.9-STD, DOD Ammunition and Explosive Safety Standards, dated October 5, 2004, paragraph C4.3.1.3. The K-factor is a scientific numerical value/conversion ratio which has been calculated for various pounds per square inch (PSI) values. The PSI values are associated with blast overpressure and K24 is the value that will assure personnel protection from blast and thermal effects. The safe separation distance for the screening operator will be based upon a K40 value which is a 54 foot safe separation distance (see the Fragmentation Data Review Form in Appendix H of this WP). The UXO Technician will operate the screener from behind a 0.56 inch thick hard steel barrier with a 1 foot wide by 1 foot long hole cut into the steel and covered with 2.87 inch thick Plexiglas (see the Fragmentation Data Review Form in Appendix H of this WP). The Plexiglas will allow the UXO Technician to view the screening operation without stopping after every bucket load from the backhoe, thus increasing overall throughput of the excavation operation. With an On-Off Switch, or Kill Switch, at the required distance for K40 factor, the UXO Technician will operate the screening machine once the backhoe operator has filled

the holding container with the backhoe buckets contents and moved clear of the screening machine (approximately 25 ft).

The backhoe operator will be protected as long as he remains inside the cab, which will be armored to the standards outlined in Table 2-4 of this WP and the UXO Technician will be protected as long as he/she remains behind the sandbag barricade, in the event of a detonation. Once the screening operator determines that the soil loaded into the screener has cleared the screening process, he/she will turn the screener off using the remote switch and investigate the contents of the screening machine. This method of operation will continue until the entire area required to be cleared of MEC is completed.

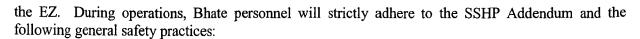
The shoreline will be cleared of all debris and MEC material using a mag/dig approach. Two lateral-transect strips approximately three feet wide running the length of the shoreline (300 feet) will be investigated using the mag/dig approach. The first transect strip along the shoreline will be approximately 7 feet above the low tide mark and the second transect will be 7 feet further inland and approximately parallel to the first transect strip. These two transect strips will cover approximately 20% of the area from the low tide up to 25 feet into the shore. If no MEC or explosive contaminated MEC related scrap is found during investigation of these transect strips, it will be reasonably assumed that this area does not contain any DMM burial pits, and no further removal effort will be undertaken for the area near the shoreline (all other areas on site will be excavated using large backhoe procedures).

If MEC or explosive contaminated MEC related scrap is found during investigation of these transect strips, then a removal action in the remainder of the 25 feet by 300 feet area of concern will be undertaken. A total area of 300 feet long by 25 feet wide from the low tide mark out to the shore will be cleared using the mag/dig approach. This area will be divided into grids for the purpose of data collecting. Each grid will be an area of 50 feet long by 25 feet wide and all anomalies will be investigated using the following methods with UXO Technicians.

- To gain access to a subsurface anomaly, excavation will be initiated to the side of the anomaly, and will not be conducted directly over the anomaly until such time as the depth of the anomaly can be ascertained.
- Additional excavation will be conducted with care using small hand tools only.
- A Dig Sheet will be kept on site by the UXO Technician III during the excavation operation.
- A detailed accounting of all MEC located at the site will be accomplished by the SUXOS using a UXO Field Log Book.
- Entries will be made for each MEC item indicating the item's identity, its explosive hazards, location (x, y, and z measurements) and final disposition.
- All munitions debris excavated during this investigation will be removed from the site.

All MEC remediation activities at MEC suspected sites will be under the supervision of UXO qualified personnel. Non-UXO trained personnel will not be allowed in the exclusion zone (EZ) during intrusive operations. If access is required by non-UXO qualified personnel all work will stop while they are in

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- Operations will be conducted only during daylight hours.
- Access to operating areas will be limited to only those personnel necessary to accomplish the specific operation.
- MEC will only be handled by qualified UXO Technicians.
- During MEC operations the MSD between MEC and non-MEC operations is fragmentation distance of the MGFD, as stated in Section 2.12 of this WP.
- During demolition operations personnel remaining on-site will be limited to those personnel needed to safely and efficiently prepare the item/s for destruction.
- All personnel will attend the daily safety briefing (tailgate safety briefing) prior to entering the operating area.
- Anyone can stop operations for an unsafe act or situation.
- Safety violations and/or unsafe acts will be immediately reported to the UXOSO.

Failure to comply with safety rules/procedures may result in termination of employment.

3.1 Site Preparation

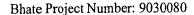
Prior to any machinery being deployed onto the site a surface clearance of the entire upland work area will be conducted by the two UXO Teams. The SUXOS will mark the area in a grid coordinate utilizing a large map and indicate that each sector has been cleared by the UXO Team. One UXO Team member will carry one of the magnetometers listed in Section 2.11.4 of this WP. The grid to be cleared will be marked using white or blue pin flags as a method of identification of the MEC type. Once the grid is cleared, the senior UXO Technician will mark this in his daily log to report to the SUXOS at the end of the operation or duty day, which ever the SUXOS directs.

A registered Land Surveyor will survey each of the clearance areas accompanied by a UXO escort. Surveying activities will consist of locating clearance area boundaries, establishing permanent survey monuments, and establishing grids for geophysical investigation activities within the clearance areas. The area to be excavated will be approximately 300 feet long by 175 feet wide and will be verified by the Land Surveyor and Bhate Project Manager using the final design drawings (Baker, 2004).

The site layout and search grids will be established using a licensed surveyor. Survey crews will be escorted in the field by a UXO Technician II who will provide MEC avoidance including checking the intended survey stake locations with a magnetometer prior to driving stakes into the ground. This will prevent driving stakes into buried MEC.

3.1.1 Exclusion Zone

During the surface sweep of the upland area, the UXOSO will mark off an area of 219 feet (see Figure 3-1 in Appendix B) from the edge of the area that will be searched. This area includes a part of Chase Road. Guards or guard material, such as road barriers or signs, will be posted at both ends of the road to keep unauthorized personnel out of the exclusion zone. They will have direct contact with the UXOSO and the SUXOS.



This EZ will remain in effect for surface sweep and subsurface excavation operations so long as the 3-inch projectile is the MGFD. In the event a larger munitions item is found, the EZ will be expanded and the ESS amended accordingly.

3.1.2 MEC Recovery

During the surface sweep operation, if any MEC material is discovered, the UXO Team will immediately notify the SUXOS who will initiate the procedures to extend the Exclusion Zone. Once the exclusion zone is extended, the UXO Team will attempt to identify the MEC material. The MEC will be identified by two UXO Technicians II or III and marked IAW the approved WP for future disposition. If detonation cannot be arranged the same day as the MEC is identified, a guard will be posted during the non-working hours to ensure the item is not disturbed by the public. The data to be recorded for each item discovered during anomaly excavation will include the following (as applicable):

- Type (e.g., MD, MPPEH, UXO, and non-MEC Scrap)
- Description (e.g., "projo, 20-mm, practice, MK105" and "base, coupling, firing device")
- Initial Condition (e.g., expended, inert, live, and to be determined [TBD])
- Approximate length
- Approximate width
- Depth
- Approximate weight
- Found in a pit?
- Piece of frag?
- Initial disposition (e.g., left in place and removed to scrap pile)
- Requires demolition? (See Section 3.5 of this WP for determination of whether the MEC item is Safe or Unsafe to move)

All data will be turned into the site SUXOS at the end of the day. Based upon the determination of the MEC being safe or unsafe to move, the UXO Team will prepare for a blow-in-place at Site 7 or transportation to the NWSY OB/OD Range for disposal.

3.2 Excavation of Upland Area Using EMM

MEC items discovered during sweep operations will be recovered, identified, and marked by contractor UXO technicians in accordance with the approved WP.

The SUXOS will mark the upland area in a grid coordinate utilizing a large map for tracking purposes. Once the UXO Team has cleared a sector, the SUXOS will mark on the map that this area

has been cleared. The grid to be cleared will be marked using white or blue pin flags as a method of identification of the MEC type. Once the grid is cleared, the senior UXO Team member will indicate in his daily log to report to the SUXOS at the end of the operation or duty day, which ever the SUXOS directs. A 2-foot reference line will be placed on the backhoes extension arm to assist in the total depth of excavation. A UXO Team member will also carry a measuring device that will be used to determine that the soil was excavated a minimum of 1 foot from the earth's surface.

While excavating with EMM, a UXO Technician will be stationed in a position that is out of the reach of the excavation equipment but affords a view of the excavation site. This observer will ensure that the next lift is visually free of MEC. The excavated material will be placed onto the screening machine platform or bin. The excavated material will be screened for range related debris, munitions debris, small metallic debris, and MEC items. UXO Technicians will recover all pieces of munitions debris or range related debris and any MEC items. After screening, the soil spoils will be stockpiled to the side of the screening area designated by the SUXOS and UXOSO.

The UXO Technician will communicate with the excavator operator via hand signals to stop the excavation, if suspected MEC are observed. If this happens, the excavator operator will immediately place the excavator bucket on the ground and shut down the excavator. The UXO Technicians will then examine the item to determine if it is MEC material. If both UXO Technicians positively identify the item as inert, the item will be removed and placed in the appropriate scrap pile. If the item is live MEC, or if any doubt exists, the item will be assumed to be explosive filled and all work will stop. The item will be marked using white or blue pin flags as a method of identification of the MEC type and an exclusion zone will be established using Table 2-3 and Figures 3-1 and 3-2 in Appendix B of this WP. If the excavated MEC is larger than the current MGFD, the UXO Team will determine the new MSD using DDESB Technical Paper 16, Methodologies for Calculating Primary Fragment Characteristics, dated 1 December 2003.

3.2.1 Exclusion Zone

During the excavation of the upland area, the UXOSO will mark off an area of 219 feet (see Figure 3-1 in Appendix B) from the outer edge of the area that will be searched. This area will include part of Chase Road. Guards or road block materials, such as barriers or road signs, will be posted at both ends of the road to keep unauthorized personnel out of the exclusion zone. They will have direct contact with the UXOSO and the SUXOS.

This EZ will remain in effect for surface sweep and subsurface excavation operations so long as the 3-inch projectile is the MGFD. In the event a larger munitions item is found, the EZ will be expanded and the ESS amended accordingly.

3.2.2 MEC Recovery

MEC items discovered during upland excavation operations will be recovered, identified, and marked by contractor UXO technicians in accordance with the approved WP. If detonation cannot be arranged the same day as the MEC is identified, a guard will be posted during the non-working hours to ensure the item is not disturbed by the public. The data to be recorded for each item discovered during anomaly excavation will include the following (as applicable):

• Type (e.g., MD, MPPEH, UXO, and non-MEC Scrap)

- Description (e.g., "projo, 20-mm, practice, MK105" and "base, coupling, firing device")
- Initial Condition (e.g., expended, inert, live, and TBD)
- Approximate length
- Approximate width
- Depth
- Approximate weight
- Found in a pit?
- Piece of frag?
- Initial disposition (e.g., left in place and removed to scrap pile)
- Requires demolition? (See Section 3.5 of this WP for determination of whether the MEC item is Safe or Unsafe to move)

All data will be turned into the site SUXOS at the end of the day. UXO Technicians will use a *Daily Operations Summary* form located in Appendix A of this WP to document actions taken each day. The UXO Technicians will blow-in-place any MEC that is determined unsafe to move by the UXO Team. If the MEC item is determined safe to move, it will be transported to the NWSY OB/OD Range for disposal.

3.2.3 Screening Operations During MEC Excavation of Upland Area

The UXO Technician will operate the screening machine from a distance greater than what is required for a K-factor value of K24, IAW DDESB 6055.9-STD, DOD Ammunition and Explosive Safety Standards, dated October 5, 2004, paragraph C4.3.1.3, which will provide the required protection from blast and thermal effects. The K-factor is a scientific numerical value/conversion ratio which has been calculated for various PSI values. The PSI values are associated with blast overpressure and K24 is the value that will assure personnel protection from blast and thermal effects. The safe separation distance for the screening operator will be based upon a K40 value, which is a 54 foot safe separation distance (see the Fragmentation Data Review Form in Appendix H of this WP).

The following options are available for use to provide the protection required for the Screening Operators.

- The UXO Technician will remain behind a sandbag barricade that is at a minimum of 54 feet from the screener prior to its operation with unscreened earth. Once the backhoe operator has filled the holding container with the backhoe bucket contents the UXO Technician will operate the screening machine with the On-Off Switch, or Kill Switch.
- The UXO Technician will operate the screener from behind a 0.56 inch thick hard steel barrier with a 1 foot wide by 1 foot long hole cut into the steel and covered with 2.87 inch thick

Plexiglas (see the Fragmentation Data Review Form in Appendix H of this WP). The Plexiglas will allow the UXO Technician to view the screening operation without stopping after every bucket load from the backhoe, thus increasing overall throughput of the excavation operation. This option will allow the UXO Team to remain with 18 feet of the screening machine and provide a continuous operation increasing overall efficiency.

The backhoe operator will be protected behind a minimum of 2.87 inch thick Plexiglas (see the Fragmentation Data Review Form in Appendix H of this WP). This method of operation will continue until the entire area required to be cleared of MEC is completed. The upland area operations will consist of three phases; Site Preparation, Excavation, and Screening.

The UXO Disposal Teams will conduct a surface sweep of both the upland and shoreline area (Figure 3-3 in Appendix B shows the upland area as that which has the screening machine, and the shoreline area is where the geotextile tubes are being placed) before any EMM or mag/dig operations are conducted. The surface sweep will be conducted in an orderly fashion where the UXO Technicians will line up approximately at arms length and walk in an orderly fashion while looking for any MEC material that may be on the surface. A hand held magnetometer will be used to search within areas that the UXO Teams will not be able to see clearly, such as under shrubs and bushes. After the surface sweep is conducted, the team will prepare the site for excavation of the upland area.

The screening of the soil removed during the excavation efforts will be accomplished using a commercial screener with a capacity of 5 cubic yards. The UXO Technician will operate the screener from behind a sandbag barricade wall that will be located outside of the K40 PSI value, as indicated in the Fragmentation Data Review Form located in Appendix H of this WP.

A hopper grid will be used to pre-screen large material, acting as a two stage screening process. Figure 3-4 in Appendix B shows a picture of a typical screening machine with the pre-screen attachment. During the screening operation, the backhoe operator will place the excavated soil into the basket of the screening equipment. The UXO Technician will not start the screening process until the backhoe is clear from the screening equipment.

Once the backhoe operator is clear from the screening machine, the UXO Technician will start the screening machine with the remote operator key while behind the sandbag barricade. Once all the soil is sifted out, one UXO Technician will inspect the pre-screen attachment and conveyor belt for any MEC material. Once the pre-screen and conveyor belt are cleared of any MEC material, all scrap will be placed into a roll-off container for disposal by a local landfill contractor. This process will be repeated throughout the upland area that is required to be excavated. Figure 3-3 in Appendix B shows the proposed location of the screening equipment, barricade wall, and where the screening operator will be located during the process. The actual location of the screening equipment may not remain the same, but will always be located within the work area shown on Figure 3-3 in Appendix B. The remote operator will remain behind a 24-inch thick sandbag barricade, sufficiently high to protect from potential hazardous fragments, located at least 54 feet from the screening operation to provide K40 overpressure protection as well as hazardous fragment protection. Personnel, who are not protected by the barricade, will be withdrawn outside of the 219 foot exclusion zone during screening operations.

UXO Technicians will use the *Daily Operations Summary* Form located in Appendix A of this WP, to document actions taken each day. The UXO Technicians will blow-in-place any MEC that is

determined unsafe to move by the UXO Team. If the MEC item is determined safe to move, it will be transported to the NWSY OB/OD Range for disposal.

Upon completion of the excavation, soil will be placed back onto the embankment to provide a slope necessary to accommodate the installation of the geotextile tubes and geomembrane protective layer.

3.2.4 MEC Recovery

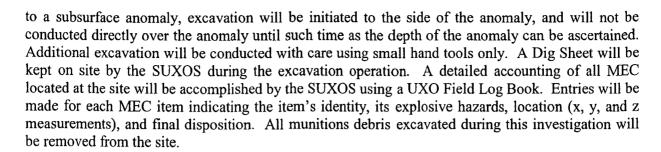
During the screening operations of the upland area, if any MEC material is discovered all operations will immediately cease. The UXO Team will immediately notify the SUXOS who will positively identify the MEC item. The MEC will be identified by two UXO Technicians II or III and marked IAW the approved WP for future disposition. If detonation cannot be arranged the same day as the MEC is identified, a guard will be posted during the non-working hours to ensure the item is not disturbed by the public. The data to be recorded for each item discovered during anomaly excavation will include the following (as applicable):

- Type (e.g., MD, MPPEH, UXO, and non-MEC Scrap)
- Description (e.g., "projo, 20-mm, practice, MK105" and "base, coupling, firing device")
- Initial Condition (e.g., expended, inert, live, and TBD)
- · Approximate length
- Approximate width
- Approximate weight
- Piece of frag?
- Initial disposition (e.g., left in place and removed to scrap pile)
- Requires demolition? (See Section 3.5 of this WP for determination of whether the MEC item is Safe or Unsafe to move)

All data will be turned into the site SUXOS at the end of the day. Based upon the determination of the MEC being safe or unsafe to move, the UXO Team will prepare for a blow-in-place at Site 7 or transportation to the NWSY OB/OD Range for disposal.

3.3 Shoreline Operations

The shoreline area will be cleared of all debris and MEC material using a mag/dig approach incorporating two lateral-transect strips approximately three feet wide running the length of the shoreline (300 feet). If MEC or explosive contaminated scrap is found during investigation of these transect strips, than a complete removal action in the remainder of the 25 feet by 300 feet area of concern will be undertaken. A total area of 300 feet long by 25 feet wide from the low tide mark out to the shore will be cleared using the mag/dig approach. This area will be divided into grids for the purpose of data collecting. Each grid will be an area of 50 feet long by 25 feet wide and all anomalies will be investigated using the following methods with UXO Technicians. To gain access



3.3.1 Mag/Dig Investigations

All analog detection and removal (mag/dig) activities at MEC suspected sites will be under the supervision of UXO qualified personnel. Non-UXO trained personnel will not be allowed in the EZ during intrusive operations. If access is required by non-UXO qualified personnel all work will stop while they are in the EZ.

Two lateral-transect strips approximately three feet wide running the length of the shoreline (300 feet) will be investigated using the mag/dig approach. The first transect strip along the shoreline will be approximately 7 feet above the low tide mark and the second transect will be 7 feet further inland and parallel with the first transect. These two transect strips will cover approximately 20% of the area from the low tide up to 25 feet into the shore. If no MEC or explosive contaminated scrap is found during the investigation of these transect strips, it will be reasonably assumed that this area does not contain any DMM burial pits, and no further removal effort will be undertaken for the area near the shoreline.

The justification for the clearance of two representative lateral transects as opposed to complete clearance of the shoreline area is as follows:

- The shore area that is proposed to be cleared is trashy, continuously moist, and it is suspected that the subsurface will contain a very high density of non-MEC related anomalies similar in nature to the trash on the surface.
- Excavation to, and recovery of anomalies to a depth of two feet below surface near the shoreline at low tide will be further complicated by the water and excavating below the water line.
- Based upon the suspected density of subsurface anomalies, clearance to a depth of two feet will be labor intensive, costly, and may not be necessary.
- The 7 foot distance between transects was concluded by reasonable analysis that any munitions buried would be in the form of a landfill or burial pit, and would extend beyond a 7 foot diameter. The statistical conclusion is that no MEC exists inside the 7 foot distance between transects and no further investigation would be required.

The lateral transect approach was discussed with the Remedial Project Manager NAVFAC Mid-Atlantic, Code EV3 on Naval Weapons Station Yorktown and it was agreed that this approach met safety requirements, was efficient, and acceptable. To gain access to a subsurface anomaly, excavation will be initiated to the side of the anomaly, and will not be conducted directly over the anomaly until such time as the depth of the anomaly can be ascertained. Additional excavation will be conducted with care using small hand tools only.

If MEC or MPPEH is found during investigation of these transect strips, then a removal action must be completed for the remainder of the shoreline area. The work will stop and a modification will be submitted to ROICC for approval prior to continuing.

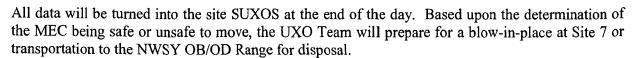
A total area of 300 feet long by 25 feet wide from the average high tide mark out to the shore will be cleared using the mag/dig approach. This area will be divided into grids for the purpose of data collecting. A Dig Sheet will be kept on site by the SUXOS during the operation. Each grid will be an area of 50 feet long by 25 feet wide and all anomalies will be investigated using the following methods with UXO Technicians.

Additionally, based on the historical data, the 3-inch projectile will be the item used to discriminate anomaly detection to a depth of two feet. If other MEC is discovered that is smaller than the 3-inch projectile, then an adjustment to the detection equipment will be made to discriminate for that smaller size.

3.3.2 MEC Recovery

MEC items discovered during shoreline excavation will be recovered, identified, and marked by contractor UXO Technicians in accordance with the approved WP. If detonation cannot be arranged the same day as the MEC is identified, a guard will be posted during the non-working hours to ensure the item is not disturbed by the public. The data to be recorded for each item discovered during anomaly excavation will include the following (as applicable):

- Type (e.g., MD, MPPEH, UXO, and non-MEC Scrap)
- Description (e.g., "projectile, 20-mm, practice, MK105" and "base, coupling, firing device")
- Initial Condition (e.g., expended, inert, live, and TBD)
- Approximate length
- Approximate width
- Depth
- Approximate weight
- Found in a pit?
- Piece of fragmentation?
- Initial disposition (e.g., left in place and removed to scrap pile)
- Requires demolition? (See Section 3.5 of this WP for determination of whether the MEC item is Safe or Unsafe to move)



3.3.3 Exclusion Zone

During the mag/dig operations of the shoreline area, the UXOSO will mark off an area of 219 feet from the edge of the area that will be searched, as illustrated in Figure 3-1 in Appendix B. This area should not include part of Chase Road and guards or guard material, such as road barriers or signs, will not be posted as would be accomplished during the Upland Excavation Operations.

This EZ will remain in effect for surface sweep and subsurface excavation operations so long as the 3-inch projectile is the MGFD. In the event a larger munitions item is found, the EZ will be expanded and the ESS amended accordingly.

3.4 Use of Sandbag Enclosures

The Structural Branch, United States Army Engineering and Support Center Huntsville (USAESCH), sponsored a test program in 1997 to evaluate the use of sandbag enclosures for fragment and blast mitigation, for intentional detonations at MEC sites. Southwest Research Institute (SwRI), under contract to USAESCH, performed a two phase test program of sandbag enclosures. Measurements were made of the overpressures at various places, sandbag throw distances, depth of fragment penetration, and noise levels. High-speed film cameras, video recorders, and digital cameras were used to visually record the events. The results of these tests have been used to develop guidelines for the use of sandbag enclosures. USAESCH Memorandum *Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions*, dated August 1998, provides guidance on the required sandbag thicknesses, configuration, and construction of the sandbag enclosures, and withdrawal distances based on the greater of sandbag throw distances or 200 feet. This document will be part of the WP and available at the site for use in the event that any MEC is uncovered.

Using the MGFD distance for the 3-inch projectile, the maximum sandbag throw distance is 200 feet. A total sandbag thickness of 24 inches will be required for the outer wall that will be surrounding the munitions. All materials required for the sandbag enclosure construction will be kept at the site in the field trailer.

3.5 Demolition Operations

All MEC items requiring detonation will be marked with two crossed pin flags pending the blow in place (BIP) disposal. All demolition operations will be supervised by the SUXOS and coordinated with CAX on-site Safety Specialist. All demolition operations will follow the procedures outlined in NAVSEA OP 5 Volume 1, *Ammunition and Explosives Ashore*, dated January 2001 and USACE Engineer Pamphlet 1110-1-18, *Ordnance and Explosives Response*, dated April 2000. Demolition operations will be performed on an as needed basis and will only be performed during daylight hours. Procedures for the demolition of MEC material are located in Appendix E of this WP, *MEC Demolition Standard Operating Procedures*.

3.5.1 Safe-to-Move/Unsafe-to-Move Criteria

MEC items will be inspected by the SUXOS and a decision of whether the MEC item is safe-to-move or unsafe-to-move will be made using the following guidance:

- If the MEC item is fuzed it will remain unsafe-to-move and must be BIP.
- If the MEC item is unfuzed than it will be safe-to-move and can be transported to a demolition area.

3.5.2 Explosive Storage Magazines

In the event that delivery of demolition explosives on an as-needed basis presents a timeliness difficulty, a memorandum of agreement will be finalized with the CAX safety office to guard the MEC item until the explosives arrive to the site. The item will be barricaded with sandbags IAW Section 3.4 below to reduce the overall fragmentation distance in the event of an inadvertent detonation while awaiting the arrival of demolition materials from a commercial vendor. If the MEC material cannot be disposed of until the next day due to logistics issues, a portable lighting system and posted guard will remain until the next day when the item can be disposed. No explosive site permit for a storage magazine is required.

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4 EXPLOSIVES SITING PLAN

This plan outlines the procedures Bhate will use to perform disposal support at the CAX 7 site and describes the safety criteria to be employed during MEC operations.

4.1 MECS Areas - Munitions Disposal Pits

Possible MEC has been defined as the hazard during the site visit and as per direction from NOSSA. There is evidence that 3-inch mortars could be found in this area due to the finding of a projectile that resembled a 3-inch Stokes Mortar.

4.2 Demolition Areas

MEC will be disposed of by a local contractor. Items encountered by Bhate that are identified as safe to move will be transported to the NWSY Disposal Range on the day that they are found. No MEC material will be consolidated on-site unless weather conditions or the delivery of explosives precludes the MEC from being disposed of on that day. If this is the case, the MEC item will be guarded at all times until it can be transported and disposed.

4.3 Exclusion Zone during Demolition Operations

The Exclusion Zone Distances are listed in Table 2-3 of this WP for on-site disposal operations. If the MEC item is disposed of on the NWSY Disposal Range, the Exclusion Zone will be established using NWSY Directives.

4.4 Roads

Chase Road will be blocked when intrusive activities are conducted within the MSD. Road blocks will be coordinated with the government installation on-site representative during the initial coordination meeting or kick off meeting.

4.5 Blow-In-Place

Prior to initiation of demolition operations by the local contractor, all non-essential personnel will be evacuated from the detonation site. Bhate will assist the local contractor as required during the demolition of all MEC located on-site. At no time will discovered MEC be left over night unsecured. Demolition operations will be performed in accordance with the local EOD units Standard Operating Procedures and installation regulations and Appendix E of this WP.

4.6 Collection Points

MEC collection points will not be utilized for this operation. All MEC items will be disposed of in the location where they are encountered. Suspect items that can be safely moved may be relocated within the area until transportation arrives.

4.7 Consolidated Shots

Consolidating multiple MEC is not anticipated for this project, but if it is deemed necessary, USAESCH Engineering Report, *Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites*, dated March 1998 will be used and a copy of this report will be available on site. Encountered MEC items that are acceptable to move will not be consolidated to one location to reduce the number of demolition shots. All movement of MEC will be coordinated with and approved by the on-site UXOSO and appropriate installation personnel.

4.8 Explosive Storage Magazines

There is no anticipation of storing any explosives on the installation at this time, as all efforts will be made to have them delivered the day of the disposal operation. Explosives for BIP operations will be delivered to the site on an as-needed basis. Total control of explosives will be maintained while the explosives are on site. All vehicles transporting explosives will be properly inspected, equipped, and placarded prior to the loading of explosives onto the vehicle. Any commercial explosive company delivering explosives to the base will meet 49 CFR §177.800-870.

In the event that delivery of demolition explosives on an as-needed basis presents a timeliness difficulty, a memorandum of agreement will be finalized with the CAX safety office to guard the MEC item until the explosives arrive to the site. The item will be barricaded with sandbags IAW Section 3.4 below to reduce the overall fragmentation distance in the event of an inadvertent detonation while awaiting the arrival of demolition materials from a commercial vendor. If the MEC material cannot be disposed of until the next day due to logistics issues, a portable lighting system and posted guard will remain until the next day when the item can be disposed. No explosive site permit for a storage magazine is required.

4.9 Delivery on an As-Needed Basis

Demolition explosives will be provided by a local vendor on an as-needed basis and will be delivered to the site in day boxes. All delivered demolition material will be consumed the day in which it is delivered, and there is no need for explosive storage. MEC will be marked and guarded, if necessary, until disposal is accomplished. If overnight guarding is required, portable lighting system and posted guards will be utilized to keep unauthorized personnel from entering the site and protect the public.

4.10 Explosive Management

Explosives for countercharging MEC will be obtained from a local vendor on an as-needed basis. Appendix E of this WP, MEC Demolition Standard Operating Procedures, outlines the procedures for ordering demolition material from the explosives contractor. No demolition explosives will be maintained at the site or on the installation overnight. If demolition is required, all efforts will be made to arrange delivery of the explosives early enough in the day to complete the operation. If the explosives cannot be delivered to logistic delays, the item will be guarded overnight until the demolition material can be delivered. Procedures for handling any MEC material encountered during excavation operations are described in Appendix E of this WP, MEC Demolition Standard Operating Procedures.

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4.10.1 Acquisition

Bhate will acquire commercial explosives from a local vendor or vendors who will deliver the materials to the project site or the NWSY EOD Range. Bhate maintains a valid Bureau of Alcohol, Tobacco, and Firearms (BATF) user of high explosives permit. Explosives vendors with a valid dealer BATF license will be utilized. A copy of the BATF dealer license and the Bhate BATF user permit will be maintained at the project site, and upon request, will be made available to any local, state, or federal authority.

Types and estimated quantities of explosives and their intended use during the former MEC project are specified below. The commercial explosives vendor identified for this MEC remediation is Reactives Management of Chesapeake, Virginia. Typically, the following explosives will be used for disposal of MEC or venting of inert munitions:

- One-half pound Cast Boosters will be used to detonate the MEC.
- Detonating cord will be used to construct mainline-branch line shots, to link multiple shots together, or to transmit the explosive train to the main charge explosive when the main charge is buried (tamped), underwater, or otherwise inaccessible.
- NONEL Initiators will be used to initiate the explosive train. NONEL tubing will be used to
 transmit the explosive train from the igniter to the demolition devices. Shock tube priming of
 explosives offers the instantaneous action of electric detonation without risk of accidental
 initiation of the blasting cap (and the charge) by radio transmitters in the area, or by static
 electricity discharge. The explosion of the shock tube is entirely contained within the plastic
 tubing.

4.10.2 Initial Receipt

The explosives vendor will deliver the explosive materials to the magazines on an as-required basis. An initial receipt inventory will then be conducted. Explosives in unsealed boxes containing partial lots will be opened, and the contents of the box will be counted. Any discrepancies between the actual type and quantity of explosives received and the shipping documentation will be noted on the shipping documentation with the signatures of both the delivery driver and the individual authorized to receive such explosives. A legible copy will be filed on site. The authorized individual receiving the explosives will immediately inform the SUXOS of the discrepancy, who will in turn notify the NWSY Environmental Group, ROICC, and Project Manager. The informed managers will take the appropriate action as described in Section 4.10.4, "Lost, Stolen, or Unauthorized Use", below.

The quantities received will be consumed on the day delivered or returned to the vendor. Explosive materials will not be stored on site. A copy of the receipt documentation will be filed at the on-site office and placed in the project's permanent archive file.

4.10.3 Receipt Procedures and Inventory

This section describes the procedures that Bhate will use to maintain records of explosives inventories at the NWSY and CAX. Since no explosives will be stored on this project site, the inventory of explosives refers only the receipt and expenditure of the explosives ordered for a single day's activity.

4.10.3.1 Inventory Control and Records Management

An accurate running inventory of all explosives on site will be maintained. Copies of all paperwork pertaining to explosives delivery will be maintained by the SUXOS in the field office.

4.10.3.2 Authorized Individuals

The SUXOS will be responsible for the proper receipt and issue of explosives for detonation purposes. He or she may authorize other specific individuals to perform the receipt and initial inventory of the explosives, but cannot delegate the responsibility for ensuring that the inventory, receipt, daily storage, and handling of the explosives is performed in accordance with the requirements of this plan. Any individual authorized to receive explosives will be at least a UXO Technician III.

4.10.3.3 End User Certification

The SUXOS, as the end user of explosives, will certify in writing that the explosives were used for their intended purpose. This information is tracked on the *Explosives Usage Record* located in Appendix A and is included with daily reporting.

4.10.3.4 Reconciling Discrepancies

In the event that there is a discrepancy with any aspect of the management of explosives, the SUXOS together with the Bhate site supervisor, will review documentation to determine whether the discrepancy is a paperwork error or whether explosives have been lost or stolen. If it is concluded that explosives have been lost or stolen, the ROICC POC will be notified and the procedures specified in Section 4.10.4 of this WP will be implemented.

4.10.4 Lost, Stolen, or Unauthorized Use of Explosives

If explosives are discovered to be lost, stolen, or used without authorization, the incident will be immediately reported to the Bhate project officer, who in turn, will inform the Bhate OE/UXO Director and NAVFAC Mid-Atlantic ROICC POC.

As the federal licensee, Bhate is required by 27 CFR §55.30 to report the theft or loss of explosives to the BATF within 24 hours. In the event of such an occurrence, the following procedures will be followed:

Bhate will make the appropriate notifications in accordance with 27 CFR §55.30. These include calling BATF (800-424-9555) and the local law enforcement authorities.

Bhate will be responsible for completing and forwarding BATF Report of Theft or Loss – Explosive Materials Form 5400.5. This form will be completed by the SUXOS, and a copy will be provided to the Navy MEC Safety Specialist.

4.10.5 Disposal of Demolition Explosives

Only the explosive quantities required to complete the job will be procured. All explosives delivered to the site will be consumed or returned back to the explosives distributor on the same day. There will be no storage of explosives on site.

4.11 Transportation

This section presents the vehicle requirements and transportation procedures for on-site movement and movement over public roads with explosives at NWSY and CAX.

4.11.1 On-Site Transportation Procedures

Explosives will be delivered to the project by a licensed and permitted commercial explosives vendor. When explosives are required at the work site, Bhate UXO personnel will transport the explosives in an appropriately placarded vehicle following the procedures stated in this section to the designated area when demolition activities are planned.

On-site transportation procedures will include the following safeguards:

- The driver of any explosive-laden vehicle will ensure that the load is properly braced and that the initiators are carried separately from main charge explosives.
- The SUXOS will ensure that the driver and passengers are not carrying any smoking products or flame producing devices. Smoking will be strictly forbidden among all personnel involved in the handling or transportation of explosives.
- If loose pyrotechnic, tracer, flare, or similar mixtures are to be transported, they will be placed in #10 mineral oil or equivalent to minimize fire and explosion hazards.
- If an unfired rocket motor must be transported, it shall be positioned in such a manner as to offer the maximum protection to personnel in the event of an accident.
- If base-ejection type projectiles must be transported to a disposal area or collection point, the base will be oriented to the rear of the vehicle and the projectile secured, in the event the ejection charge detonates in route.
- All MEC items will be positively identified, as to the type of munition, filler, and condition of the fuzing prior to any movement.
- If a MEC, with exposed hazardous filler (high explosives, etc), has to be moved to a disposal area, the item will be placed in an appropriate container with packing materials to prevent migration of the hazardous filler. Padding will also be added to protect the exposed filler from heat, shock, and friction.

4.11.2 Vehicle Requirements

Vehicles transporting explosives on the project site will comply with the following requirements:

- Vehicles transporting explosives will be placarded when carrying any Class 1 explosives.
- All vehicles transporting explosives will be equipped with reliable communications, a first aid kit, and two 10-pound class B and C fire extinguishers. One extinguisher will be located in the driver's compartment and the other located in the cargo compartment.
- Vehicles transporting explosives will be inspected daily when in use, and the inspections will be documented on an *Explosives Transportation Vehicle Safety Checklist* (see Appendix A of this WP). The vehicle used to transport the explosives will have a non-sparking bed liner, and all explosive loads will be covered prior to departure.

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5 QUALITY CONTROL PLAN

This Quality Control Plan (QCP) provides the procedures and methods that will be used at CAX IR Site 7 and supplements the Quality Control Plan (Appendix A, Final WP Site – 1 Landfill Near Incinerator [Bhate, 2003]). This plan addresses management and responsibilities, equipment testing and calibration, QC inspections and audits, and reporting procedures.

5.1 Quality Management Structure

The following paragraphs describe the organizational structure of the Quality Management Team for Bhate during operations at CAX Site 7.

5.1.1 Corporate QC Manager

The Bhate QC Manager has responsibility for Bhate's QC program. The QC Manager reports directly to the President of Bhate on matters of effectiveness, adequacy, and status of QC methods and procedures and maintains an alternate line of communication to the Bhate Project Manager assigned to this Task Order. The QC Manager has the following responsibilities:

- Preparation of Bhate QC policies and procedures
- Ensuring timely submission of contract deliverables
- Providing training and assistance to the UXOQCS
- Reviewing employee qualification records to ensure accuracy
- Conducting periodic field audits of sites, programs, and projects to ensure QC compliance

5.1.2 Corporate Project Manager

The Bhate Project Manager is responsible for the overall performance during this project. The Project manager will develop and implement the site WP. The Bhate Project Manager has the following responsibilities:

- Monitoring project cost and performance
- Ensuring timely submission of contract deliverables
- Reporting directly to the Bhate Program Manager

5.1.3 Senior UXO Supervisor

The SUXOS is responsible for the day-to-day operations at the project site. The SUXOS reports directly to the Bhate Project Manager or designated representative. The SUXOS has the following responsibilities:

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- Implementation of Bhate's WP and QC policies and procedures
- Reporting to the Bhate Project Manager on effectiveness, adequacy, and status of the project
- Ensuring the timely submission of contract deliverables
- Analyzing any failures and implementing corrective actions
- Establishing additional guidelines to assist in the development of site and task specific policies and procedures

5.1.4 UXO Quality Control Specialist

The UXOCQS is responsible for the enforcement of the site QCP. The UXOQCS will coordinate with the SUXOS for daily operations and maintains a direct line of communication to the Bhate QC Manager. The UXOQCS reports directly to the Project Manager and has the following responsibilities:

- Reviewing, implementing, and enforcing the QCP.
- Coordinating with the NWSY or Navy Quality Assurance (QA) representative to ensure QC objectives are appropriate for the task being performed.
- Coordinating with the Bhate QC Manager to ensure QC procedures are appropriate in demonstrating validity sufficient to meet QC objectives.
- Conducting QC inspections and audits of documents, work in progress, work performed, and monitoring. Recording and reporting the results to the appropriate personnel.
- Recommending to the SUXOS any actions to be taken in the event of a QC failure.
- Advising the SUXOS on all QC related site matters.
- Reporting non-compliance with QC criteria to the SUXOS and the Bhate Project Manager.
- Has STOP WORK authority for issues regarding QC at the project site.
- Check anomaly excavation prior to remedial activities.

5.2 Qualifications and Training

5.2.1 Employee Qualifications

Bhate will maintain personnel files on each employee at the project site. These files include copies of necessary license, training records, certificates of qualifications, and resumes that support the employee's placement and position. Prior to an employee's initial assignment, or before any change in duties or assignment, the UXOQCS will review the employee's file to ensure necessary qualifications are met. Site personnel must meet the qualifications as outlined in USACE DID OE-025 and DDESB Technical Paper 18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel, dated 20 December 2004.

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5.2.2 Employee Training

Bhate ensures that only qualified and trained personnel are assigned to project sites. Prior to mobilization of personnel, Bhate ensures that training required by Bhate and OSHA 29 CFR §1910.120 has been completed for all personnel assigned to the project. In addition, prior to the start of operations all personnel will receive the following:

- Familiarization with the WP, and its policies and procedures
- Site-Specific Safety and Health Plan orientation and PPE training
- Environmental considerations peculiar to the operations on the project site
- Instruction and training on equipment usage and safe work practices
- Daily safety training outlining the day's activities

Training is conducted by the UXOSO and records of attendance are maintained on site. Certificates of training are issued when applicable.

5.3 Instrument and Equipment Testing, Calibration, and Maintenance

Instruments and equipment used to gather and generate data will be tested with sufficient frequency and in such a manner as to ensure that accuracy and reproducibility of results are consistent with the manufacture's specifications.

The method performed for measuring the instrument response will be conducted at the start of each workday, over a test area, and that response will be compared to a known response recorded prior to the instrument being placed into service. Instruments or equipment failing to meet the standard will be repaired, recalibrated, or replaced. Replaced instruments or equipment must meet the same specifications for accuracy and precision as the item removed from service.

Items such as cellular telephones and radios will be tested for serviceability at the start of each workday. Results of these tests will be recorded in the Daily Operations Summary. Items failing these tests will be repaired or replaced prior to operations commencing.

5.3.1 Test Area

Bhate will establish a test area outside of the work site which will contain a "seed" item. The seed item when working in the CAX Site 7 will be a 3-inch projectile or authorized similar substitute to a depth of 2-feet. All seed items must be free of hazardous items/materials. This seed item will be placed into the ground at approximately 1 to 3 feet at a location known only by the UXOQCS. The location and orientation will be recorded on the *Daily Quality Control Report*. The following Pass or Fail criteria will be used during the Daily Quality Control Inspections conducted by the UXOQCS:

• If a UXO Technician cannot locate the seed item within one transect sweep it will constitute a failure in the operations of locating MEC accurately and the operation of detection equipment.

- If a UXO Technician locates the seed item within one transect sweep it will constitute a pass in the operations of locating MEC accurately and the operation of detection equipment.
- If an instrument fails to detect the seed item it will constitute a failure.
- If an instrument detects the seed item it will constitute a pass.

5.3.2 Calibration

Instruments and equipment requiring calibration or recalibration will have this accomplished in accordance with the manufacture's recommendation or owner's manual. Calibrations will be completed on a prescribed schedule and the calibration results recorded in the daily field logbook. Recalibration will be performed as necessary with the reason for the recalibration and the results recorded in the *Daily Operations Summary* form.

5.3.3 Maintenance

Scheduled maintenance will be performed in accordance with the manufacturers/owner's recommendation or owner's manual for equipment requiring regular upkeep. This equipment includes but is not limited to:

- Vehicles
- Large Backhoe
- Powered Equipment
- PPE
- Communications Equipment
- Magnetometers and Metal Detectors
- Emergency Equipment

Repair or replacement parts will meet the manufacturer's requirements/recommendations and be installed by personnel authorized to replace parts or make repairs. Records pertaining to the testing, repair, and/or replacement of instruments and equipment will be maintained on site by the UXOQCS.

5.3.4 Nonconformance Actions

Any nonconformance to contractual requirements will be documented and reported. Nonconformance includes:

- Delivery of items or services by client that do not meet the contractual requirements
- Errors made in following work instructions or improper work instructions

- Unforeseeable or unplanned circumstances that result in items or services that do not meet quality, contractual, and/or technical requirements
- Technical modifications to the project by individuals without the authority to do so
- Errors in craftsmanship and trade skills

Immediately upon receipt of a notice of nonconformance the SUXOS will take the following corrective actions:

- Identify the impact the nonconformance has on the project or its activities
- Identify and implement necessary actions required to bring the project or activity back into compliance
- Identify and implement procedures to preclude a reoccurrence of the nonconformance

5.4 Quality Control Report

The UXOQCS will prepare a *Daily Quality Control Report*. This report is submitted to the SUXOS for distribution to the appropriate personnel. This report will include:

- The periodic assessment of accuracy, precision, and completeness of work performed
- Significant QA/QC problems and corrective actions taken
- Work progress
- Lessons learned and change recommendations
- Signature of the UXOQCS

5.5 Quality Control Measures

During performance of the MEC Clearance, Bhate will perform Daily QC inspections of on-going and completed work, and QC inspections of equipment and supplies. Bhate is responsible for the quality control of the surface and subsurface excavation activities and for ensuring that only those procedures and processes conforming to contractual requirements and accepted project plans are implemented. Government Quality Assurance Inspections will be conducted by the Naval Explosive Ordnance Disposal Technical Division Explosive Safety Officer from Indian Head, Maryland.

Detailed Quality Control information to include pass/fail criteria, site documentation, and field reports are described in the following sections.

5.5.1 Quality Control Inspections, Audits, and Reports

The UXO Safety Officer, who is the same individual as the UXOQCS, is responsible for the accomplishment of operational checks of instruments and equipment by site personnel. The appropriate log entries will be made. Inspections and or audits will be performed at random, with

unscheduled checks of the site to ensure personnel accomplish all work as specified in the WP. The UXOQCS will submit a report to the Bhate Project Manager detailing the results of these checks.

5.5.2 Pass or Fail Criteria for MEC Removal

Any MEC or Munitions Debris encountered within the area of concern during the Quality Control Inspections or the Government QA Inspection will constitute a failure. Grids that pass the QC inspection will be notated in the Daily Quality Control Form. A failure will occur if any UXO item is found at a depth of 1 foot or less of the shoreline operations selected transects. A UXO failure will constitute a safety failure as well. Failures will be documented, reported, and corrective actions taken, to include a re-sweep of the grid. Any non-conformance to contractual requirements will be documented and reported in writing to the SUXOS, Quality Control Manager (QCM), and Project Manager (PM). The SUXOS will be responsible for the field remediation of any non-conformance areas evaluated.

5.5.3 Corrective Actions

Project personnel have a daily responsibility to promptly identify and report problem areas, solicit approved corrective actions, and report any condition adverse to quality. Corrective actions will be documented and verified by follow-up reviews and checks. Corrective actions will be initiated at a minimum when:

- Predetermined acceptance standards are not attained
- Procedures or data compiled are determined to be faulty or contain errors
- Equipment or instrumentation is found to be faulty
- Quality Control requirements are violated
- Results of audits or inspections reveal substandard performance
- As directed by management assessment

5.5.4 Nonconformance Actions

Any nonconformance to contractual requirements will be documented and reported. Nonconformance includes:

- Delivery of items or services by client that do not meet the contractual requirements
- Errors made in following work instructions or improper work instructions
- Unforeseeable or unplanned circumstances that result in items or services that do not meet quality, contractual, and/or technical requirements
- Technical modifications to the project by individuals without the authority to do so
- Errors in craftsmanship and trade skills

Immediately upon receipt of a notice of nonconformance the SUXOS will take the following corrective actions:

- Identify the impact the nonconformance has on the project or its activities
- Identify and implement necessary actions required to bring the project or activity back into compliance
- Identify and implement procedures to preclude a reoccurrence of the nonconformance

5.5.5 Quality Control Report

The UXOQCS will prepare a *Daily Quality Control Report*. This report is submitted to the SUXOS for distribution to the appropriate personnel. This report will include:

- The periodic assessment of accuracy, precision, and completeness of work performed
- Significant QA/QC problems and corrective actions taken
- Work progress
- Lessons learned and change recommendations
- Signature of the UXOQCS

5.6 Contractual Submittals

All required submittals will be delivered in accordance with contractual obligations. Submittals will be generated by the responsible office or section and reviewed at the next higher level to ensure they meet contractual requirements. Changes or revisions to existing documents will be conducted in the same manner. Work will be accomplished in a timely manner, with submittals processed/communicated to the appropriate personnel or agency.

5.7 Communications Logs and Records

Activity Logs will be maintained daily as applicable, and all entries will be in ink. Logbooks will be bound and pages consecutively numbered. Logbooks and records may be supplemented by the use of preprinted forms (i.e. safety inspection forms, tailgate safety briefings, etc). These forms help to ensure uniformity of activities being conducted, inspected, and reviewed. Forms that may be used during the project are located in Appendix A of this WP. The following activity logs, reports, and records will be maintained on site and are subject to inspection.

5.7.1 Daily Operations Summary

The Daily Operations Summary will be maintained by the SUXOS. It provides a summary of all operations conducted on site to include:

- Date and recorder of information
- Start and end time of work activities

- Work stoppage
- Weather conditions
- Changes to the WP, SSHP, policies or procedures
- Injuries and/or illnesses
- MEC encountered
- Signature of the SUXOS

5.7.2 Tailgate Safety Briefing

This form will be used to conduct the daily safety briefing prior to the startup of daily operations.

5.7.3 Safety Meeting/Training Record

This form is required as a historical record for all training provided to UXO technicians prior to the start of field operations. It will also record the daily safety meeting conducted by the UXOSO.

5.7.4 Employee Injury Report

This form will be used in the event of an injury to personnel on site. A copy will be submitted to the Bhate Health and Safety Manger, Site Program Manager, and the Bhate Certified Industrial Hygienist (CIH).

5.7.5 Damaged Equipment/Vehicle Accident Report

This form will be used in the event of any damage to the equipment during field operations. A copy will be submitted to the Bhate Site Project Manager.

5.7.6 Safety Inspection Report

This form will be used to record all inspections completed on equipment at the site. A copy of each inspection will be maintained with the *Daily Operations Summary*.

5.7.7 Daily Quality Control Report

The Daily Quality Control Report will be maintained by the UXOQCS. This report is used to record all QC matters associated with the project site, including:

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- Equipment testing and results
- QC inspections and audits performed
- Work stoppage due to QC issues
- Equipment monitoring results
- Non-conformance reporting
- Other relevant events
- Date and teams checked

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Signature of UXOQCS

5.7.8 Visitors Log

This form will be used to sign in all visitors to the site and a copy will be maintained with the *Daily Operations Summary*.

5.7.9 Weekly Operations Summary

This form will be used to record the weekly events and will be submitted to the Site Project Manager.

5.7.10 Anomaly Dig Sheet

This form will be used to record the excavation of all anomalies during field operations.

5.7.11 Explosive Transportation Vehicle Safety Checklist

This form will be used each time explosives are transported on-site, to the site, or any movement during field operations.

5.7.12 Explosives Usage Record

This form will be used to document the consumption of all explosive materials during the project.

5.7.13 Report of Theft or Loss – Explosive Materials

This form is a United States Department of Justice Bureau of Alcohol, Tobacco, Firearms, and Explosives form which must be completed within 24 hours of discovery of a theft or loss of explosives.

5.7.14 Training Records

Training records will be maintained by Bhate. These records contain any licenses, certificates, or other qualifying data, to include:

- Date and nature of training
- Personnel attending and instructor(s)
- Visitor training and briefings
- Signature of instructor and SUXOS

5.7.15 Photographic Logbook

A Photographic Logbook will be maintained by the SUXOS. This logbook is used to record all photographs taken on the project site. These photographs are used to document MEC encountered, and before, during, and after work and/or site conditions. Photographs will include:

• Date and time taken

- Unique identifying number(s) relating to the Photographic Logbook
- Location video or photograph was taken
- Brief description of the subject matter

5.7.16 Final Closeout Report

The Final Closeout Report shall be generated upon completion of the project in accordance with the requirements outlined in the contract. This report shall include all relevant data, lessons learned, changes to procedures or equipment, or recommendations used to substantiate findings within the report. QC documentation will be incorporated into the final report or submitted as supporting documentation.

5.7.17 Field Logbooks

The Field Logbooks are maintained by the Supervisory Personnel. These logbooks are used to record site activities and field data. Logbooks are maintained in a neat and legible manner and provide an historic record of site activities, to include:

- Date and team location
- Personnel and work performed
- Equipment and instrument checks
- Injuries and/or illnesses
- Changes to work instructions
- Work stoppage
- Visitors
- Other relevant events
- Signature of Supervisor

5.7.18 Safety Logbook

The Safety Logbook will be maintained by the site UXOSO. This logbook is used to record all safety matters associated with the project site, including:

- Safety briefings and/or meetings
- Training
- Safety inspections and audits performed
- Work stoppage due to safety issues
- Visitors

- Accidents, incidents, and near misses with corrective action taken
- Site control measures
- Other relevant events
- Date and teams checked
- Signature of the UXOSO

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6 SITE SAFETY AND PERSONAL PROTECTIVE EQUIPMENT

6.1 Site Safety and Health Plan Addendum

The approved Site Safety and Health Plan has been amended to address specific potential health and safety hazards associated with performing the work under this task order and is located in Appendix D of this WP. UXO personnel performing work at Site 7 will follow the Bhate SSHP presented in the approved CAX Site 7 SSHP Addendum. Exceptions to the SSHP are as follows for the UXO Technicians.

- Non-metallic toed protective safety boots will be worn during MEC support operations involving the use of ferrous detection equipment.
- Hard hats will not be worn unless an overhead hazard exists. Hard hats may create an unsafe condition by falling off of the head of a UXO Technician at a critical moment.

Otherwise, PPE will be worn by Bhate UXO personnel in accordance with the guidance in the referenced document. This is anticipated to be Level "D" PPE modified to include non-steel toed protective boots and to eliminate the requirement for wearing a hard hat if no overhead hazard is present. Both of these modifications comply with the requirements of the USACE EP 385-1-95a Basic Safety Concepts and Considerations for OE Operations (June 2001).

6.2 Safety Oversight

A Bhate UXOSO will work with the UXO Team to ensure that the requirements of the SSHP located in Appendix D of this WP, are followed. The UXO Technicians must also conduct a review of the Activity Hazard Analysis (AHA) tables in the SSHP located in Appendix D of this WP.

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7 COMMUNICATION

7.1 UXO Work Plan Amendments or Corrections

During the course of the project, the hazards, risks, or explosives safety controls may change due to any discovery of new or unusual MEC material. Many of these changes will require an amendment to the WP. Other changes may require only a correction to the WP.

7.1.1 Amendment

This is a change that requires approval. Submit amendments through the same approval chain as the original submission. The following is a list of changes in the project scope that would require a change submittal.

- A change in the planned reuse of the property that affects the proposed response actions.
- A change in the clearance depth that affects the planned land reuse.
- The land use restrictions (to be placed in land transfer documents) change for any reason.
- The estimated MEC and munitions constituents (MC) depth changes, causing a change in the clearance depth.
- The clearance depth changes from below the frost line to above it.
- The removal action incorporates new or modified engineering controls.
- Quantity-Distance (Q-D) arcs decrease.
- A new magazine storage area or demolition ground is established.

7.1.2 Correction

This is a change that doesn't require approval. Submit correction to the Explosive Safety Submission review authorities for information only. Use common sense in deciding whether to send in a correction to the approved submission. For example, the area to be cleared increases but nothing else changes within the scope of work.

7.2 Public Involvement

The public is informed of the status of the remedial activities conducted at NWSY Cheatham Annex through Resident Advisory Board (RAB) meetings at Yorktown, Virginia. These meetings are conducted quarterly and are attended by representatives from NWSY, local, state and federal regulators, environmental contractors and the public.

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8 PHYSICAL SECURITY PLAN FOR RECOVERED CHEMICAL WARFARE MATERIALS

Bhate does not anticipate any encounters with Recovered CWM (RCWM); therefore a Physical Security Plan for RCWM is not required.

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9 REFERENCES

The following references and Data Item Descriptions are part of this WP:

29 CFR Part 1910, OSHA General Industry Standards.

29 CFR Part 1926, Construction Industry Standards.

29 CFR §1910.120/29 CFR §1926.65 - Hazardous Waste Site Operations and Emergency Response.

40 CFR Parts 260 to 299, Applicable sections of EPA regulations.

40 CFR Part 300, National Contingency Plan.

49 CFR Parts 100 to 199, Applicable sections of the Department of Transportation (DOT) regulations.

Baker Environmental, Inc. (Baker), March 2001, Final Field Investigation Report, Site 7 and AOC 2, Naval Weapons Station Yorktown, Yorktown, Virginia, Cheatham Annex Site.

Baker, June 2004, Final Trenching and Limited Field Investigation Report Site 7N, Naval Weapons Station Yorktown, Cheatham Annex.

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9-2 June 2006 Project Number: 9030080

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APPENDIX A CONTRACTOR FORMS

LIST OF FORMS

- 1. DAILY OPERATIONS SUMMARY
- 2. TAILGATE SAFETY BRIEFING
- 3. SAFETY MEETING/TRAINING RECORD
- 4. EMPLOYEE INJURY REPORT
- 5. DAMAGED EQUIPMENT/VEHICLE ACCIDENT REPORT
- 6. SAFETY INSPECTION REPORT
- 7. DAILY QUALITY CONTROL REPORT
- 8. VISITORS LOG
- 9. WEEKLY OPERATIONS SUMMARY
- 10. Anomaly Dig Sheet
- 11. EXPLOSIVES TRANSPORTATION VEHICLE SAFETY CHECKLIST
- 12. EXPLOSIVES USAGE RECORD
- 13. REPORT OF THEFT OR LOSS EXPLOSIVE MATERIALS

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DAILY OPERATIONS SUMMARY

WORK SUMMARY		
a. Work Accomplished: Num	ber Completed	Total Remaining
(1) Survey		
(2) Preparation		
(3) Mag & Flag		
(4) Geophysical		
(5) Intrusive		
(6) Quality Control		
(7) Quality Assurance	44	
b. Discrepancies:		
c. Inspection Results:	Pass	Fail
(1) Quality Control		
(2) Quality Assurance		
(3) Safety		

3. UXO SUMMARY

a. UXO Located:

Type:	Quantity:	Live/Prac.:	Remarks:
		 	
		 	
		<u> </u>	
		-	

b. Demolition Supplies Expended:

Type:	Quantity:	Remarks:
		-

c. Scrap Generation / Deposition:

Type:	Quantity:	Weight:	Remarks:
	 		

4. Utilization

a. Daily Man-hours:

Labor	Task	M/H Used	M/H	% M/H	Remarks:
Category:	#:	Today:	Remaining:	Remaining:	
Project Manager					
SUXOS					
UXO Tech. III					
UXO Tech. II					
UXO Tech. I					
Laborer					
UXOSO					
UXOQCS					
Admin Personnel					
Visitor					
·					
Sub-Contractor Po	ersonnel	(List by Cates	gory)		
Work Stoppage: (1	List by ti	me and Reaso	n)		
		<u> </u>			
	<u> </u>		 		
			 		
			 		
	 		 	 	
	L	<u> </u>	<u> </u>	<u> </u>	<u> </u>

b. Daily Equipment:

Description:	Task:	Hours Used:	Hours Remaining:	% Hours Remaining:	Remarks:
Schonstedt			8	8	
Geophysical					
Truck (Heavy)					
Truck (Light)					
Radio, Base					
Radio, Handheld					
Backhoe					
Front-end Loader					
Rental Car					
GPS					
Weedeater					
Chainsaw					
Chipper					

5. Weather:		
Wind:	 	
Rain:		
Lightning:		
Cloud Cover:		

ily Operations Summary Con't.	PAGE 6 of 6 PAGES			
6. Changes to the Work Plan SSHP, or New Policies or Procedures:				
7. Injuries and/or Illnesses:				
8. Operational Remarks:				
9. Signature / Date:				
	Date: / / _			
SUXOS / Project Manager	<i>Date</i>			

AILGATE SAFETY BRIEFING Pate:		tion
Reason for Briefing: Daily Safety Briefing Initial Safety Briefing New Task Briefing Periodic Safety Meeting Personnel Attending:	New Site Procedu New Site Informa Review of Site In Other: (Specify)	nre Ition formation
. Reason for Briefing: Daily Safety Briefing Initial Safety Briefing New Task Briefing Periodic Safety Meeting . Personnel Attending:	New Site Procedu New Site Informa Review of Site In Other: (Specify)	nre ition formation
Daily Safety Briefing Initial Safety Briefing New Task Briefing Periodic Safety Meeting Personnel Attending:	New Site Informa Review of Site In Other: (Specify)	tion formation
Daily Safety Briefing Initial Safety Briefing New Task Briefing Periodic Safety Meeting Personnel Attending:	New Site Informa Review of Site In Other: (Specify)	tion formation
Initial Safety Briefing New Task Briefing Periodic Safety Meeting Personnel Attending:	New Site Informa Review of Site In Other: (Specify)	tion formation
New Task Briefing Periodic Safety Meeting Personnel Attending:	Review of Site In Other: (Specify)	formation
Periodic Safety Meeting Personnel Attending:	Other: (Specify)	
. Personnel Attending:		Position
	Signature	Position
	Signature	Position
		1
		-
Briefing Given By:		
briefing Given by.		
B. Topics: (Check All That Apply)		<u></u>
Site Safety Personnel	Decontamination	Procedures
Site/Work Area Description	Emergency Respo	
Physical Hazards	On-Site Injuries/I	
Chemical/Biological Hazards	Reporting Proced	ures
Heat/Cold Stress	Directions to Med	dical Facility
Work/Support Zones	Drug and Alcoho	l Policies
PPE	Medical Monitoring	
Safe Work Practices	Evacuation/Egress Procedures	
Air Monitoring	Communications	
Task Being Performed	Confined Spaces	
OE Precautions	Other:	
4. Remarks:		

BHATE ENVIRONMENTAL ASSOCIATES, INC. SAFETY MEETING/TRAINING RECORD

DATE:/			TIME:	AM PM
LOCATION/SITE): 			Page 1 of 2 Pages
1. Reason for Me		(Check all that apply)		
		Meeting/Training		
		fety Meeting/Training		
	New Task Br	iefing ty Meeting/Training		
·	New Site Pro			
	New Site Info			
		iew of Site Information		
	Other (Expla			
2. Personnel Atte	ending Meeting	Training:		
Name		Signature		Company
··········				
				
	· · · · · · · · · · · · · · · · · · ·			

Bhate Environmental Associates, Inc.

Decontamination Procedures
Decontamination Procedures
Decontamination Procedures
Emergency Response Plan
Hazard Communities
On-Site Emergency
On-Site Injuries/Illnesses
Evacuation Procedures
Rally Point(s)
Emergency Communication
Directions to Medical Facility
Drug and Alcohol Policies
Medical Monitoring Program
Specific Task Training
Confined Spaces
Heavy Equipment
Other: (Specify)
cord received the Information and/or tending this meeting/training will receive vir assigned duties.
Date://

BHATE ENVIRONMENTAL ASSOCIATES, INC. EMPLOYEE INJURY REPORT

Site/Location:	Control Number:	Page 1 o	f 2 Pages
This is an official document to be initiated	d by USA supervisors. Be accurate, thro	ugh, and answer all questions.	
	BACKGROUND DATA		
Today's Date://	Date of Accident:/_	/ Time:	AM PM
Day of Accident: S M T W T F S	Weather Conditions: Sur	nny Clear Rain Fog	Overcast
Temperature: 0-32 32-50 50-70 70)-85 85 + Wind Co	onditions: Still Moderate	High None
Location of Accident:	Time Ac	cident was Reported:	AM PM
		l to Whom:	
	PERSONAL DATA		
Name: Last	First	M	II <u>-</u>
Sex: F M DOB:	Place of	Birth:	
SSAN: DO	H:/	Position:	·
Address:		City:	State:
Telephone Number: ()		Zip:	
	ACCIDENT DATA		
Nature of Accident: Near Miss	1 st Aid Dr Visit Ar	nbul Hospitalized	_ Fatality
If Fatality, Name of Agency Notifie	d:	Type of Injury:	
Did Employee Leave the Work Site	Yes No If Yes	s, Time Departed:	AM PM
Name of Medical Facility:		Telephone Number: ()
Address:	City:	State:	Zip:
Description of Accident:			
Activity at Time of Accident:			

	WITNESS DATA		
Witness Name: Last	First		MI
Address:	City:	State:	Zip:
Telephone Number: ()	Employed By:		
Statement Attached: Yes No	Telephone Number: (
ACCID	ENT ACTIONS/ANALYSIS		
Accident Cause(s):			
Lack of Safety Equipment a Factor: Yes _			
Safety Regulations or Guidance Violated:	Yes No If Yes, Exp	lain:	
Photographs Taken: Yes No I	f Yes, Located at:		
Regulatory Agencies Notified: Yes	No If Yes, which:		
Point of Contact:	Date and Time:/		AM PM
Corrective Actions Taken or Recommend	ded:		
Report Prepared By:	Signature:		
SUX	OS/PROJECT MANAGER		
Corrective Actions/Recommendations:			
SUXOS Signature:		Date: _	
Concur With Actions Taken: Yes N	No Remarks:		
Project Manager Signature:		Date: /	

BHATE ENVIRONMENTAL ASSOCIATES INC. DAMAGED EQUIPMENT/VEHICLE ACCIDENT REPORT

Page 1 of 4 Pages						
Control Number: Insurance File #:						
Vendor File #:						
This is an official document to be initiated by USA Personnel. Be thorough, accurate, and answer all questions that apply.						
BACKGROUND INFORMATION						
TODAY'S DATE:/ DAMAGE/ACCIDENT DATE://						
TIME DAMAGE/ACCIDENT OCCURRED: AM PM DAY: S M T W T F S						
TIME DAMAGE/ACCIDENT REPORTED: AM PM						
LOCATION OF OCCURRENCE:						
WEATHER CONDITIONS: CLEAR OVERCAST RAIN FOG SNOW OTHER:						
TEMPERATURE RANGE: -0 0-32 32-50 50-70 70-85 85-100 100+						
WIND: NONE LIGHT MODERATE HIGH						
ACTIVITY AT TIME OF DAMAGE/ACCIDENT:						
WERE INJURIES SUSTAINED?YESNO						
IF YES, NUMBER OF PERSONNEL: WERE INJURY REPORTS FILED?YES NO						
DEDGON ODED ATING FOLUBNIENTERATIVES D						
PERSON OPERATING EQUIPMENT/VEHICLE						
LAST NAME: FIRST NAME: MI:						
SSN: DATE OF HIRE: / / TEAM NUMBER:						
SUBCONTRACTOR:YESNO						
POSITION/OCCUPATION:						
ADDRESS/TELEPHONE NUMBER:						

DAMAGED EQUIPMENT/VEHICLE ACCIDENT REPORT CON'T: CONTROL NUM	Page 2 of 4 Pages MBER:
INSURANCE F)	ILE #:
VENDOR FILE	#:
EQUIPMENT/VEHICLE DESCRIPTION	
OWNERS NAME AND TELEPHONE NUMBER (ie; Hertz, COE, US Rentals):_	
EQUIPMENT/VEHICLE DESCRIPTION (include make, model, type, etc.):	
IDENTIFICATION NUMBER(S) (ie; VIN, serial, license, Government/company	ID number(s):
DESCRIBE NATURE OR EXTENT OF DAMAGE:	
HOW WOULD YOU CLASSIFY THE DAMAGE?SUPERFICIALMIN	NORMAJOR
SUPPORTING DOCUMENTATION	
HAS A POLICE REPORT BEEN FILED? YES NO	
IF YES, POLICE REPORT NUMBER:	
IS POLICE REPORT ATTACHED? YES NO	
IF NO, WHEN WILL POLICE REPORT BE AVAILABLE?	
POLICE TELEPHONE NUMBER:	
ARE WITNESS STATEMENTS AVAILABLE? YES NO	
IF YES AND NOT ATTACHED EXPLAIN:	

DAMAGED EQUIPMENT/VEHICLE ACCIDENT REPORT CON'T:	Page 3 of 4 Pages
CONTROL NUME	BER:
INSURANCE FILE	Ξ#:
VENDOR FILE #:	

ANALYSIS	
WERE SAFETY REGULATIONS, GUIDANCE, POLICIES, OR LA	WS VIOLATED?
YESNO IF YES, EXPLAIN:	
PHOTOGRAPHS TAKEN? YES NO IF YES, LOCA	TION OF PHOTOGRAPHS:
CORRECTIVE ACTIONS/RECOMMENDATIONS TO BE TAKEN	
IDENTIFY ANY SUPPORTING/ADDITIONAL DOCUMENTS:	
ANALYSIS PREPARED BY:	
SIGNATURE:	_
SENIOR UXO SUPERVISOR:	
RECOMMENDATIONS:	
SIGNATURE:	_ DATE:/
USA PROJECT MANAGER:	
CONCUR WITH ACTIONS/RECOMMENDATIONS: YES	NO
REMARKS:	
SIGNATURE:	DATE://

DAMAGED EQUIPMENT/VEHICLE ACCIDENT REPORT CON'T: Page 4 of 4 Pages						
	CONTROL NUMBER:					
	INSURANCE FILE #:VENDOR FILE #:					
	, market and market an					
REPAIR/REPLACEMENT DATA						
ESTIMATED COST OF REPAIR:	DOWN TIME:					
ESTIMATED COST OF REPLACEMENT:	REPLACE TIME:					
INSURANCE CLAIM FILED? YES NO	IF YES, DATE: / /					
IS THIS A PAY DIRECT? YES NO	AMOUNT:					
DATE DEDUCTIBLE PAID:/	AMOUNT:					
DATE VENDOR PAID:/	AMOUNT:					
DATE INSURANCE PAID:/	AMOUNT:					
DATE CLOSED:/						
SUPPORTING DOCUMENTS ATTACHED? YES	NO					
IF YES, IDENTIFY:						
COMMENTS:						
REVIEWED BY: SIGNATURE						
NAME						
	DATE:/					
APPROVED BY: SIGNATURE						
NAME						

DATE:_

TITLE/POSITION

SAFETY INSPECTION REPORT

BHATE ENVIRONMENTAL ASSOCIATES, INC.

Site / Location:				Date://	
Type of Inspection:	Daily	Weekly	Re-Inspection	Other	
	~				·····
Equipment Inspected:		fety or Operation			
Comments:					
	·				
Deficiencies Found or	Noted:				
Corrective Action:					
Re-Inspection Require				of Re-Inspection:	
Signature: Site S	afety Officer			SUXOS / Project	Manager
Site 5	arcty Officer			2011057110500	1.14114601

^{*} Copy to Supervisor if Deficiencies or Corrective Action were found, noted or deemed necessary.

Bhate Environmental Associates, Inc. DAILY QUALITY CONTROL REPORT Date: __/___ Contract #: Task Order #: Site/Location: Page 1 of 2 Pages Temperature: ____ Rainfall: Weather: 1. Preparatory Inspection: Results: 2. QC Audits Performed a. Operations: Results: b. Safety: Results: c. Administrative: Results: d. Equipment: Results:

Daily Quality Control Report Con'	t:		Page 2 of 2 Pages
3. QC Performed (Grids)			
Number of Grids QC'd:	Results:	# Pass	# Fail
Comments:			
4. Follow Up Inspections and Res	ults		
Section(s):			
Results:			
5. Instructions Received:			
Remarks:			
QC Signature:		_ Date: _	
Printed Name:			

VISITORS LOG

Project Location:	Page 1 of 1 Page
	Month of:

DATE:	NAME:	AGENCY OR COMPANY:	PURPOSE OF VISIT:	SAFETY BRIEFING:	ESCORT REQ:	TIME IN:	TIME OUT:	REMARKS:
	_							
_								

WEEKLY OPERATIONS SUMMARY

iber Completed	Total
	-
	
Pass	Fail
	

3. UXO SUMMARY

a. UXO Located:

Туре:	Quantity:	Total:	Remarks:
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b. Demolition Supplies Expended:

Type:	Quantity:	Total:	Remarks:
			

c. Scrap Generation / Deposition:

Type:	Quantity:	Total:	Weight:	Total:

4. Utilization

a. Weekly Man-hours:

Labor	Task:	M/H Used	M/H Total	M/H	% M/H
Category:		This Week:	Used:	Remaining:	Remaining:
Project Manager					
SUXOS					
UXO Supervisor					
UXO Specialist					
UXO Assistant				_	
Laborer					
Site Safety					
Quality Control					
Admin Personnel					
Visitor					
Sub-Contractor Pe	ersonnel	(List by Categ	gory)		
				 	1
	 	 		1	<u> </u>
	<u> </u>	1			

b. Weekly Equipment:

Description:	Task:	Hours Used:	Total Hours Used:	Hours Remaining:	% Hours Remaining:
Schonstedt	l				
Geophysical					
Truck (Heavy)					
Truck (Light)					
Radio, Base					
Radio, Handheld					
Backhoe					
Front-end Loader					
Rental Car					
GPS					
Weed eater					
Chainsaw					
Chipper					

5.	Remarks:	
6.	Signature / Date:	
		Date: / /
	SUXOS / Project Manager	

					Page 1	of 1 Pag	
ite Locati	on:	Date:	Name:		Signature		
Easting	Northing	Anomaly ID	QTY	Item Description	on Depth	UXO	
				· · · · · · · · · · · · · · · · · · ·		<u> </u>	
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			REMARI	KS			

Bhate Environmental Associates, Inc. EXPLOSIVES TRANSPORTATION VEHICLE SAFETY CHECKLIST PAGE 1 OF 1 PAGE

This checklist will be satisfactorily completed prior to loading an explosives transportation vehicle. The completed and signed checklist will be kept on the on-site safety files.

Senior UXO Supervisor (authorizing transportation of explosives):							
Explosives to be transported:							
Check the fo	llowing items to ensure they are in good working order:						
Initial	ltem						
1.	Vehicle body (including non-sparking bed or transportation box)						
2.	Tires						
3.	Windshield and wipers						
4.	Rear view mirrors						
5.	Placarding (as required by cargo)						
6.	2 ABC fire extinguishers						
7.	Lights (emergency, head, parking, running, interior, backing, turn signals)						
8.	Engine (oil, coolant, belts, battery, brake fluid, wiper fluid)						
9.	Horn						
10.	Fuel						
11.	Brakes						
12.	Operational radio (successful communication check performed)						
13.	Driver know the route to be taken (attach map if required)						
14.	Load properly segregated and secured						
15.	Permission received from Senior UXO Supervisor to transport explosives						
16.	Perform notification of departure						
17.	Perform notification on arrival at destination						
Emergency	Phone Numbers:						
Driver	Safety Observer						

¹ This checklist is for on-site explosives transportation only.

Bhate Environmental Associates, Inc. EXPLOSIVES USAGE RECORD PAGE 1 OF 1 PAGE

Team Number:	Da	nte:	
Team Leader:	Pr	oject:	
EXPLOSIVES ISSUED	Signature of Tea	m Leader:	
Item	Quantity		Checker's Initials
'			
EXPLOSIVES EXPENDED	Signature of Tea	m Leader:	
Item	Quantity	Lot Number	Checker's Initials
EXPLOSIVES RETURNED	Signature of SU		
Item	Quantity	Lot Number	Checker's Initials
LIVO Cumamiaan		Data	
UXO Supervisor:		Date	
CHECKED BY	APPROVED) BY	

Report of Theft or Loss - Explosive Materials

	The state of the s	10-42	200 200	3.70	Section As In Contract		**25 1 7 100
Jpon discovery of any theft or loss of	any of your explosiv	e materi	als:				
First, contact ATF toll free at 1-800-4 report the theft or loss; Second, contact your local law enforce. Third, complete this form and attach a with additional material(s) to the near item, as applicable, to the best of your NOTE: Section 242(b), 18 U.S.C. Ch.	ement office to report my additional reports est ATF office listed r ability.	rt the the s, sheets l on the t	eft or loss to or invoice reverse. W	o obtain a police s necessary to pr 'e suggest you re	e report; and rovide the require etain a copy of the	red information, and tax then main the completed form. Please compl	the form
NOTE: Section 842(k), 18 U.S.C., Chefrom his stock to fail to report such the Codified at 27 C.F.R., Section 55.30.	apter 40, states, "It so ft or loss within twe	hall be u nty-four	nlawful fo hours of d	r any person who iscovery thereof	o has knowledge to the Secretary	e of the theft or loss of any explose and to appropriate local authorities.	ive materials es."
I. Full Name of Person Making the Re	eport (Last, First, Mi	iddle)		2. Corporate or	r Business Nam	c (if applicable)	
3a. Addréss (Street Address, City, Sta	te, and Zip Code)			· ·		3b. Telephone Number	
4. Address of Location Where Thest C	Or Loss Occurred (if	differen	t from item	,			
5. Theft or Loss	Date	T	ime	6. Name of Lo	cal Authority to	Whom Reported	
a. Discovered				7 Address of I	ocal Authority	to Whom Reported	
b. Occurred (Show approximate if exact not known)				7. Addiess of E	Docar Administry	ю мнош керопес	
c. Reported to ATF by Telephone			*	8. Police Report Number			
d. Reported to Local Authorities							
9. Explosive Materials Lost or Stolen	(Attach invoices or	addition	 				
a. Manufacturer or) (Include date and s			(Pounds	Quantity of Explosives, her of Caps)	(Dynamite, 1 each type, size	c. Type and Description Blasting Agents, Detonators, etc. , MS delay or length of legwire, a.	include for applicable
			V in the				
•	•						
			ĺ				
10. Theft or Loss Occurred From (Ch	eck upplicable box)		<u> </u>		1		
Permanent Portable Magazine Magazine	Truck		Wor	k Site	Other (Expl.	ain)	
11. Entry to Magazine Made Through	(Complete if applie	able)		12.	Number and T	pe of Locks Forced (Complete if	applicable)
Door Roof Floor	Foundatio	n []	Wali []			
Ceiling Vents Otho	or (Explain) 🔲 _						
50.00 S. 600		 				ATP 8-1	orm 5400.5

13. Other Information Pertinent t	o Thest or Loss	
14. Signature of Person Making	Report	15. Federal Explosives License or Permit, If Any
Date Received	For ATF Us	ie Only Unique Identifier
Dute Weepland	Time Received	Ondie taefiiffer

Reporting Instructions

Forward or Fax this completed form to the ATF address listed below:

Bureau of Alcohol, Tobacco, Firearms and Explosives U.S. Bomb Data Center P.O. Box #50980 Washington, DC 20091 Toll Free Fax: 1-866-927-4570

Questions regarding the completion of this form should be referred to the U.S. Bomb Data Center toll free at 1-800-461-8841.

Privacy Act Information

The following information is provided pursuant to section 3 of the Privacy Act of 1974 (5 U.S.C. § 522a(e)(3))

- Authority. Solicitation of this information is made pursuant to Title XI of the Organized Crime Control Act of 1970 (18 U.S.C. Chapter 40).
 Disclosure of a theft or loss of explosive materials is mandatory pursuant to 18 U.S.C. § 842(k) for any person who has knowledge of such theft or loss from his stock.
- 2. Purpose. The purpose for the collection of this information is to give ATF notice of the theft or loss of explosive materials, and to furnish ATF with the pertinent facts surrounding such theft or loss. In addition, the information is used to confirm and verify prior notification of this theft or loss of explosive materials.
- 3. Routine Uses. The information will be used by ATF to aid in the administration of laws within its jurisdiction concerning the regulation of explosive materials and other related areas. In addition, the information may be disclosed to other Federal, State, foreign, and local law enforcement of laws within their jurisdiction.
- 4. Effects of not supplying information requested. 18.U.S.C. § 842(k) makes it unlawful for any person, who has knowledge of the theft or loss of explosive materials for his stock, to fail to report such theft or loss within twenty-four hours of discovery thereof, to the Secretary and to appropriate local authorities. The penalty for violation of this section is a fine of not more than \$1,000 or imprisonment for not more than one year, or both. 18 U.S.C. § 844(b)

Paperwork Reduction Act Notice

This request in accordance with the Paperwork Reduction Act of 1995. The purpose of this information collection is to report the theft or loss of explosive materials. The information is used for investigative purposes by ATF officials. This information is mandatory by statute. (18 U.S.C. § 842)

The estimated average burden associated with this collection of information is 1 hour and 48 minutes per respondent or recordkeeper, depending on individual circumstances. Comments concerning the accuracy of this burden estimate and suggestions for reducing this burden should be addressed to Reports Management Officer, Document Services Branch, Bureau of Alcohol, Tobacco, Firearms and Explosives, Washington, DC 20226.

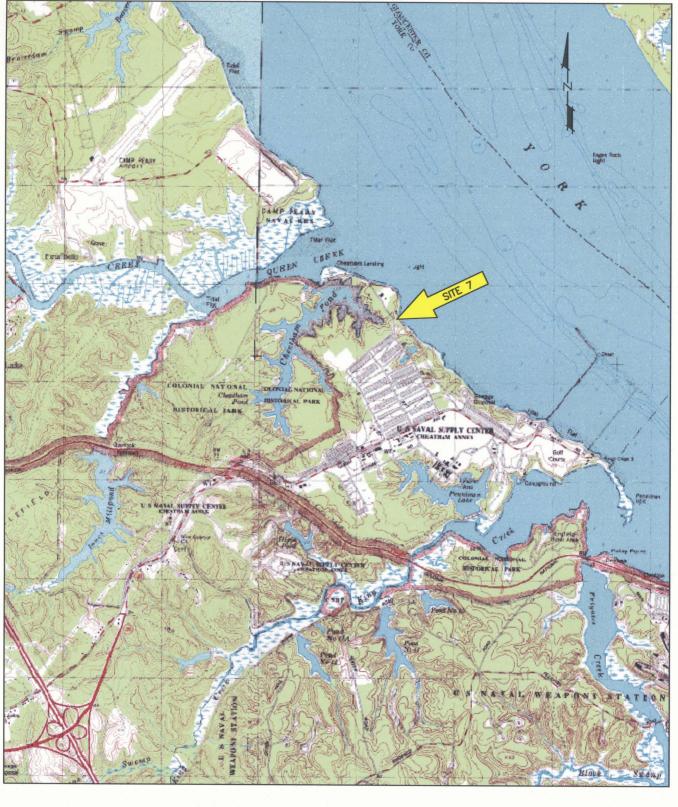
An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

ATF E-Form 5400.5 Revised August 2005

APPENDIX B

SITE MAP, MINIMUM SEPARATION DISTANCE MAPS, **AND LOCATION MAPS**

Bhate Project Number: 9030080





1" = 1 MILE



SITE 7 LOCATION MAP

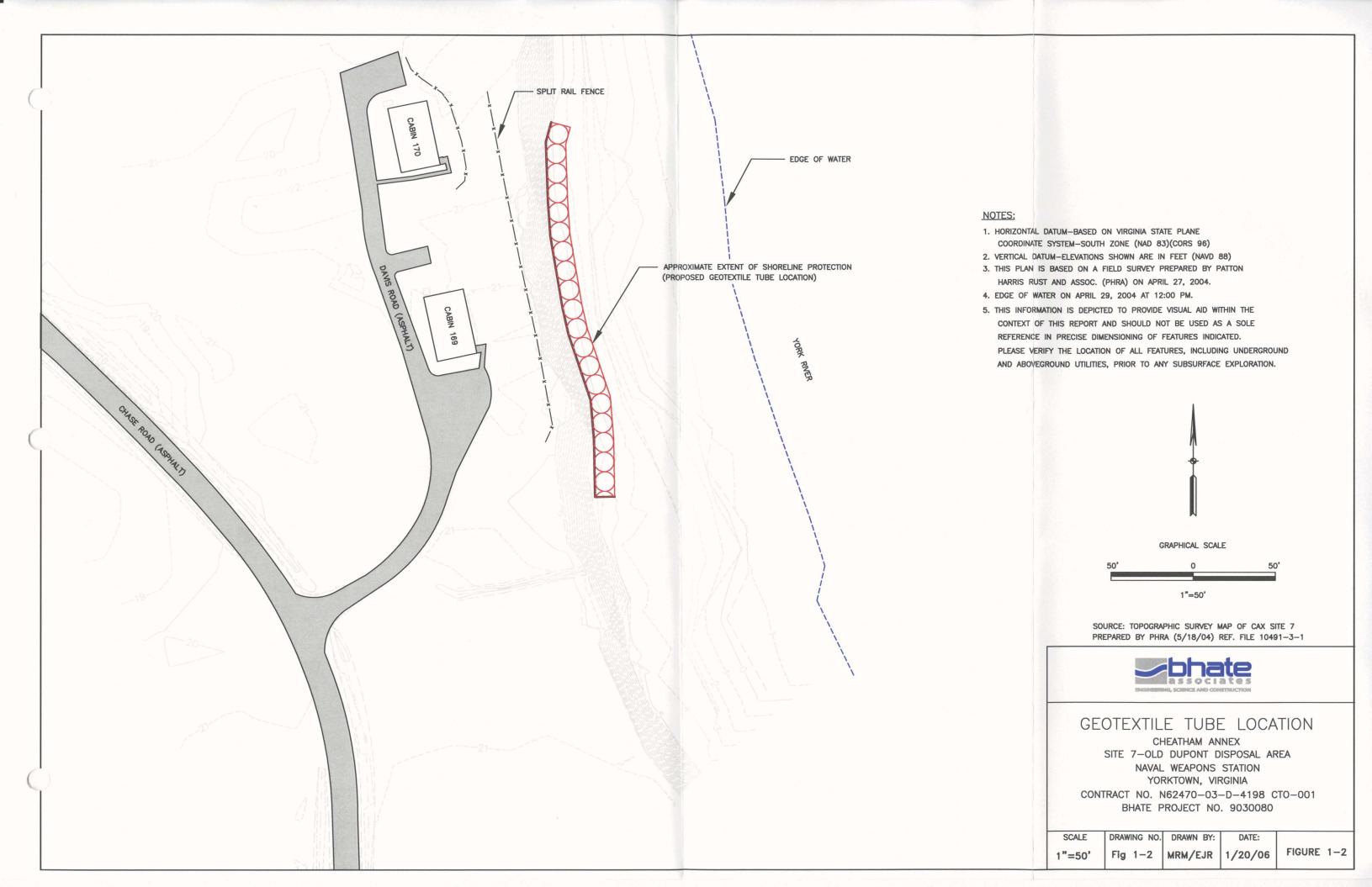
Source: Topozone.com

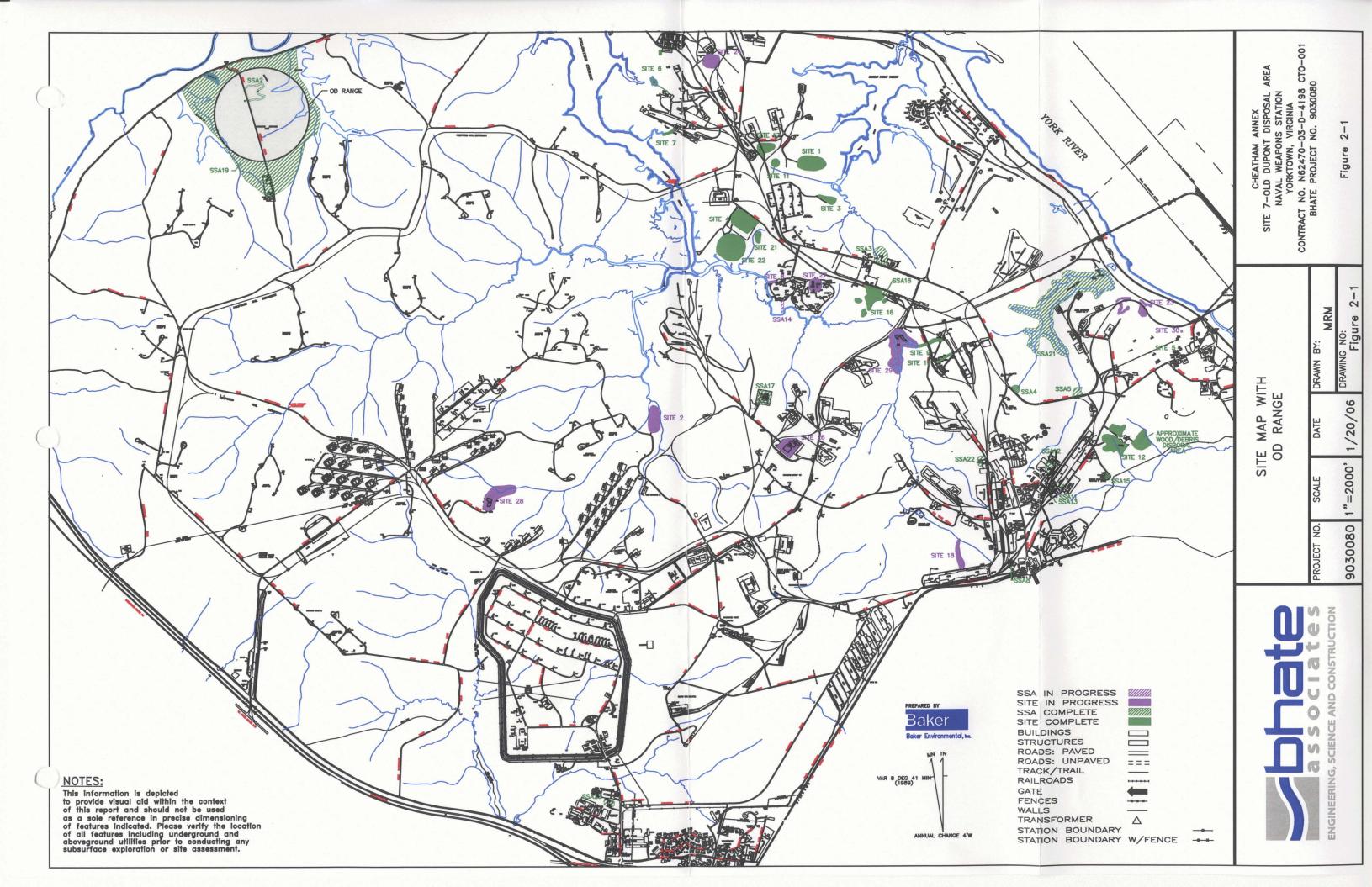
 PROJECT NO.
 SCALE
 DATE
 DRAWN BY:
 MRM

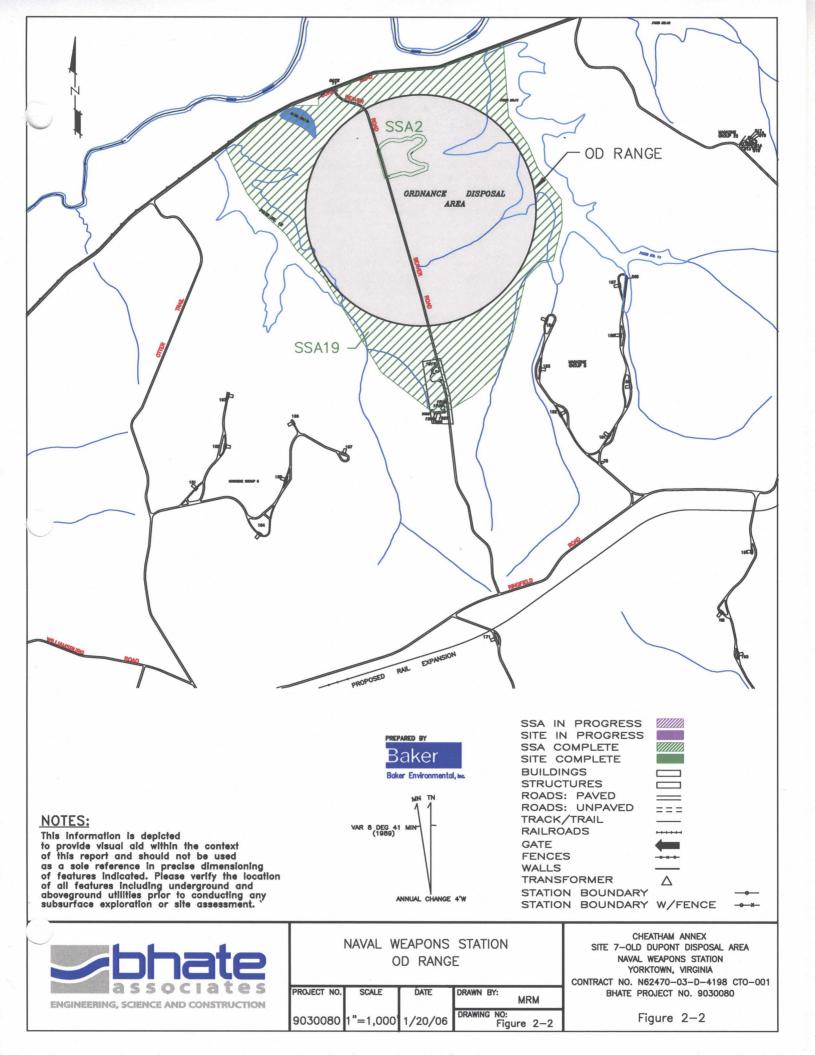
 9030080
 SHOWN
 1/20/06
 DRAWING NO:
 FIGURE 1-1

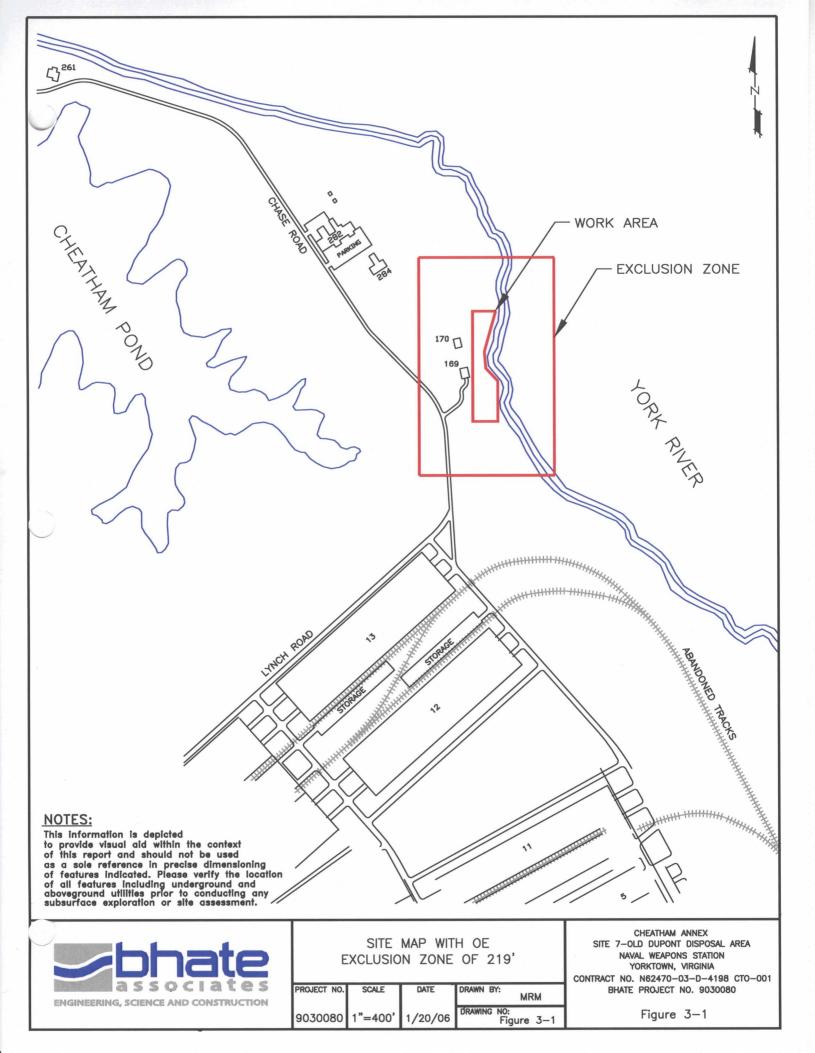
CHEATHAM ANNEX
SITE 7-OLD DUPONT DISPOSAL AREA
NAVAL WEAPONS STATION
YORKTOWN, VIRGINIA
CONTRACT NO. N62470-03-D-4198 CTO-001
BHATE PROJECT NO. 9030080

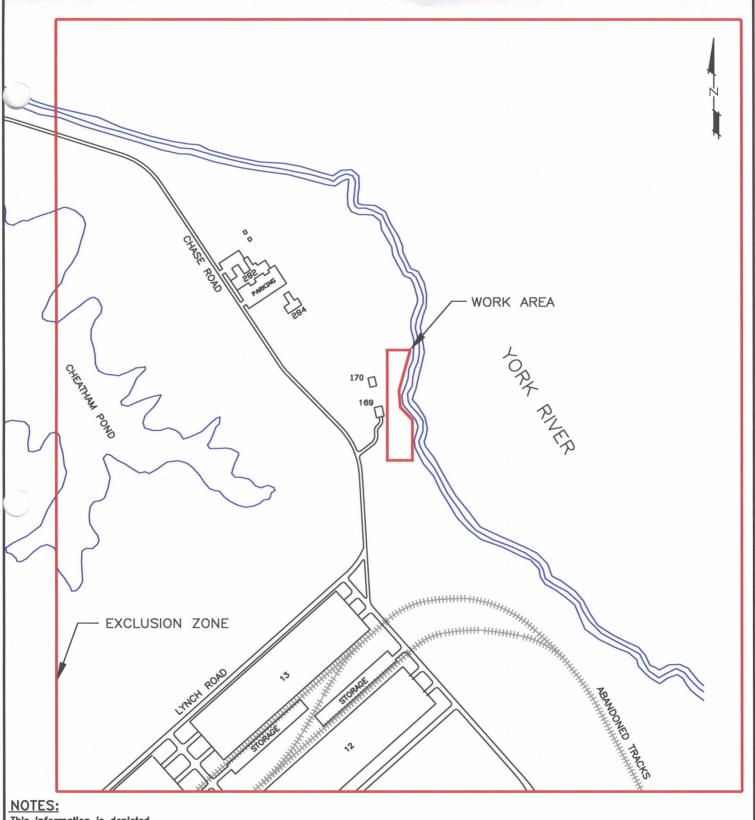
FIGURE 1-1











This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated. Please verify the location of all features including underground and aboveground utilities prior to conducting any subsurface exploration or site assessment.



SITE MAP WITH OE EXCLUSION ZONE OF 1,346'

PROJECT NO. SCALE DATE DRAWN BY: MRM

9030080 1"=400' 1/20/06 DRAWN BY: MRM

DRAWING NO: Figure 3-2

CHEATHAM ANNEX
SITE 7-OLD DUPONT DISPOSAL AREA
NAVAL WEAPONS STATION
YORKTOWN, VIRGINIA
CONTRACT NO. N62470-03-D-4198 CTO-001
BHATE PROJECT NO. 9030080

Figure 3-2

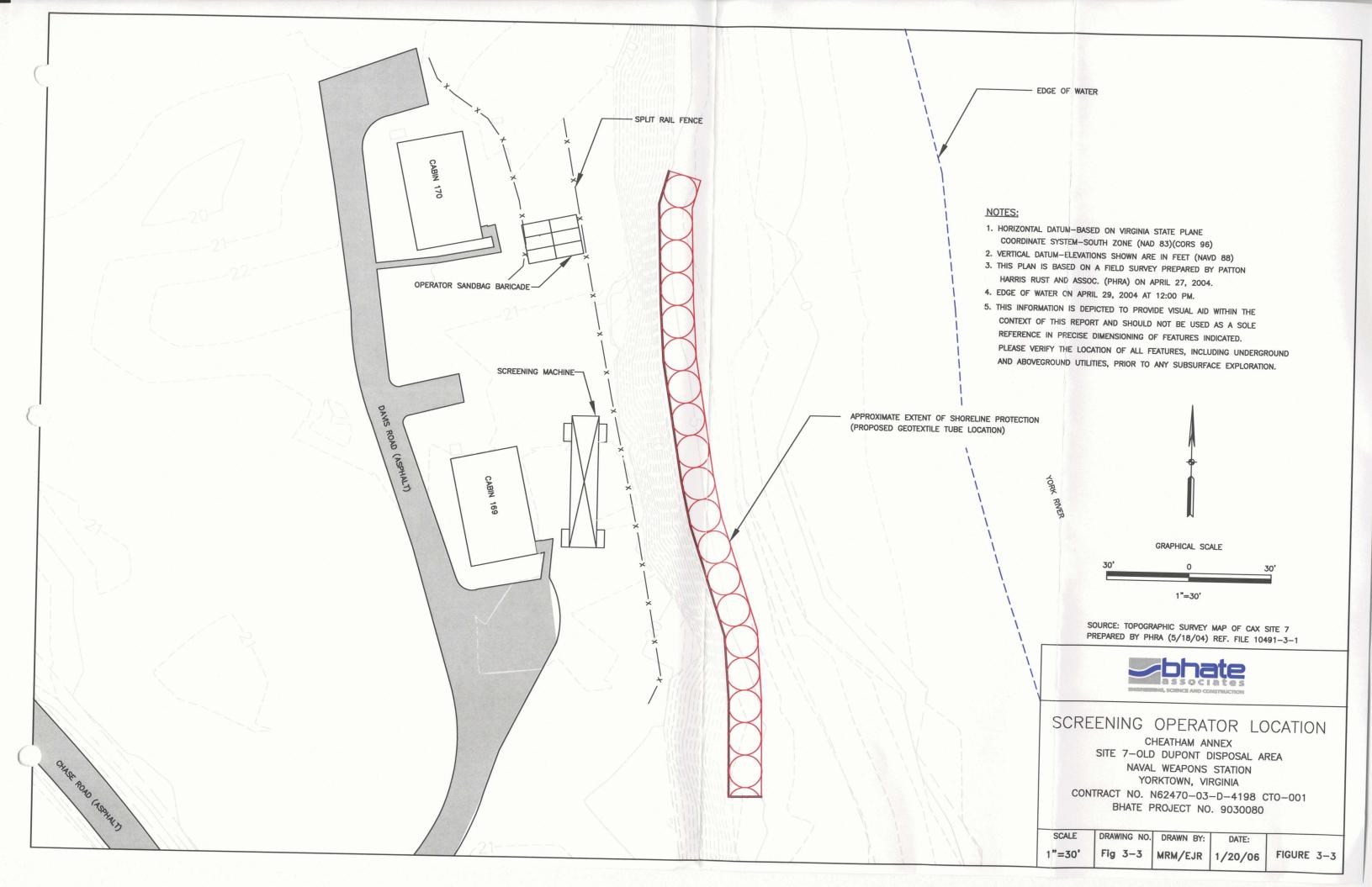




Figure 3-4 Cougar Grizzly with Pre-Screen Attachment

APPENDIX C LOCAL POINTS OF CONTACT

Local Points of Contact

Docar I wints or contact			
Contact	Telephone Number		
NWS Yorktown			
Ambulance/Paramedics	757-887-4911		
Fire	757-887-4911/7410		
Police	757-887-4911		
Environmental Group	757-887-4707 or 757-887-4775		
EOD	757-887-4177		
Naval Weapons Station Yorktown Safety Office	757-887-4554		
Cheatham Annex Safety Office	757-887-7376		
Naval Ordnance Safety and Security Activity (NOSSA) (Doug Murray)	301-744-4450		
Hospital/Medical			
Sentara Williamsburg Community Hospital 301 Monticello Avenue Williamsburg, Virginia 23185	757-259-6000		
Regional Poison Control Center	800-552-6337		
Federal Agencies			
Center for Disease Control	800-311-3435		
National Response Center	800-424-8802		
NAVFAC Mid-Atlantic			
Peninsula ROICC Office	757-847-7952		
Remedial Project Manager	757-322-4734		
Other Organizations			
American Red Cross	954-763-9900		
Judith McBride, Health and Safety Manager	205-918-4000		

205-918-4000 804-347-8803
804-347-8803
850-866-3481
205-999-7673

APPENDIX D SITE SAFETY AND HEALTH PLAN ADDENDUM

FINAL

SITE SAFETY AND HEALTH PLAN ADDENDUM

TO THE UXO WORK PLAN ADDENDUM

SHORELINE STABILIZATION/GEOTEXTILE TUBE INSTALLATION AT IR SITE 7 – OLD DUPONT DISPOSAL AREA

CHEATHAM ANNEX YORKTOWN, VIRGINIA

Prepared for:

Department of the Navy, Atlantic Division Naval Facilities Engineering Command 6506 Hampton Boulevard Norfolk, Virginia 23508-1278

Under Contract No. N62470-03-D-4198 Contract Task Order No. 0001 Modifications No. 01 and 02

June 25, 2006

Prepared by:

Bhate Environmental Associates, Inc. 1608 13th Avenue South, Suite 300 Birmingham, Alabama 35205

Bhate Project No. 9030080

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Bhate Project Number: 9030080

Bhate Project Number: 9030080

SITE SAFETY AND HEALTH PLAN ADDENDUM

SITE 7 – OLD DUPONT DISPOSAL AREA NAVAL WEAPONS STATION YORKTOWN CHEATHAM ANNEX YORKTOWN, VIRGINIA

ORIGINAL SIGNED

REVIEW SHEET

COMMITMENT TO IMPLEMENT THE SITE SAFETY AND HEALTH PLAN ADDENDUM

Town	
Jest Dickson Lanp	6/30/06
Jeli Diekson	Date
Site Superintendent/ Site Safety and Health Specialist	
Geotextile Tubes	
Cholin Shirte	6/30/06
Andy Rider, P.E.	Date
Project Manager	1101
Sm	6/30/06
Lenus M. Perkins	Date
Program Manager	
Juny 7. King	6/30/06
Tim King	6/30/06 Date
	6/30/06 Date
Tim King	6/30/06 Date
Tim King OE/UXO Director	6/30/06 Date
Tim King OE/UXO Director UXO Safety Supervisor	6/30/06 Date
Tim King OE/UXO Director UXO Safety Supervisor Site Safety and Health Specialist during MEC Work See Safety M. W.	6/30/06 Date 6/30/2006
Tim King OE/UXO Director UXO Safety Supervisor	
Tim King OE/UXO Director UXO Safety Supervisor Site Safety and Health Specialist during MEC Work See Safety M. W.	6/30/2006
Tim King OE/UXO Director UXO Safety Supervisor Site Safety and Health Specialist during MEC Work Judy McBride, CIH	6/30/2006

June 2006

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Bhate Project Number: 9030080

SITE SAFETY AND HEALTH PLAN ADDENDUM

SITE 7 – OLD DUPONT DISPOSAL AREA NAVAL WEAPONS STATION YORKTOWN CHEATHAM ANNEX YORKTOWN, VIRGINIA

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Attachment

1 Activity Hazard Analysis

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LIST OF ACRONYMS

ACGIH American Conference of Governmental Industrial Hygienists

AHA Activity Hazard Analysis

ANSI American National Standards Institute
Bhate Bhate Environmental Associates, Inc.

bpm Beats per minute CAX Cheatham Annex

CFR Code of Federal Regulations
CIH Certified Industrial Hygienist
CPR Cardiopulmonary Resuscitation
CRZ Contamination Reduction Zone

DOD Department of Defense

DOT Department of Transportation

EBCs Electric Blasting Caps
EED Electro-explosive Devices
EM Engineering Manual
EMM Earth Moving Machinery
EMR Electromagnetic Radiation
EOD Explosives Ordnance Disposal

EP Engineers Pamphlet

EPA Environmental Protection Agency
ESS Explosive Safety Submission

EZ Exclusion Zone

°F Degrees Fahrenheit

GFCI Ground Fault Circuit Interrupters HSM Health and Safety Manager

IAW In Accordance With

MEC Munitions and Explosives of Concern

MGFD Munition with the Greatest Fragmentation Distance

MSD Minimum safe Distances
MSDS Material Safety Data Sheets

NAVFAC Naval Facilities Engineering Command

NAVFACENGCOM Department of the Navy, Facilities Engineering Command NIOSH National Institute for Occupational Safety and Health

NWS Naval Weapons Station
OB/OD Open Burn/Open Detonation

OSHA Occupational Safety and Health Administration

OSIC On-Scene-Incident-Commander

PM Project Manager

PMCS Preventive Maintenance Checks and Service

LIST OF ACRONYMS (CONTINUED)

PPE Personal Protective Equipment

QA Quality Assurance QC Quality Control

ROICC Resident Officer In-Charge of Construction

RPM Remedial Program Manager
SHM Safety Health Manager
SOP Standard Operating Procedure

SPF Sun protection factor
SSHP Site Safety and Health Plan
SSHS Site Safety and Health Specialist

SUXOS Senior Unexploded Ordnance Supervisor

SZ Support Zone
TM Technical Manual
TLV Threshold Limit Values

TCRA Time Critical Removal Action

USACE United States Army Corps of Engineers

USNAVSCLEOD United States Naval Explosive Ordnance Disposal

UXO Unexploded Ordnance

UXOQCS Unexploded Ordnance Quality Control Specialist

UXOSO Unexploded Ordnance Safety Officer

WBGT Wet-Bulb Globe Thermometer

WP Work Plan

1 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.1 Contract Information

Bhate Environmental Associates, Inc., (Bhate) has been retained by the Department of the Navy, Facilities Engineering Command (NAVFACENGCOM), Norfolk, Virginia, under Contract No. N62470-03-D-4198, Contract Task Order No. 001 (CTO #0001), Modification (Mod) 02 and 03 to perform a Time Critical Removal Action (TCRA) at Site 7 (Figure 1-1 of the Work Plan (WP) Addendum), Naval Weapons Station Yorktown (NWS Yorktown), Cheatham Annex (CAX), located in Williamsburg, Virginia.

This document defines the health and safety requirements for field activities to be conducted at the site. Bhate and appropriate subcontractors will provide field activities in accordance with the contract documents. This document is a supplement to the Site Safety and Health Plan submitted in the Site 1 - Landfill Near Incinerator Work Plan (Bhate, 2003) and addresses applicable requirements of Occupational Safety and Health Administration (OSHA) in Title 29 of the Code of Federal Regulations (CFR) Parts 1910 and 1926, and the Bhate Corporate Health and Safety Plan (HASP) (Bhate, 2003). All Bhate personnel and subcontractor personnel working at the site will be briefed on the information contained in the both the Site Safety and Health Plan (SSHP) and this Addendum.

This SSHP Addendum also highlights all safety concerns during the removal operations of munitions and explosives of concern (MEC). Areas that pertain specifically to the MEC hazards will be addressed separately.

A thorough site history and description of the site are included in Section 1 of the Work Plan.

1.2 Project Description

The scope of work for this project concerns the eastern slope of the disposal area along the York River that will be stabilized to prevent further erosion of the disposal area contents into the York River. Shoreline stabilization will include the installation of sand-filled geotextile tubes. The geotextile tubes will be placed against the toe of the eroding slope and will protect approximately 240 feet of the shoreline. A scope of work and design specifications developed by Baker Environmental, Inc., for the placement of the geosynthetic tubes were provided by the Navy to Bhate.

The scope of field work for the Geotextile tube is as follows:

- Site Preparation
- Waste Disposal from the Site
- Stabilization of the Existing Slope

- Installation of the Geotextile Tubes and Scour Aprons
- Filling of the Geotextile Tubes and Scour Aprons
- Backfilling around the Geotextile Tubes and Scour Aprons
- Site Restoration

The scope of work for the MEC remediation efforts are as follows:

- Mobilization/demobilization
- MEC/ Unexploded Ordnance (UXO) Surface Sweep Operations
- Site clearing and grubbing
- MEC/UXO excavation of 15,000 square yards of earth using earth moving machinery (EMM)
- MEC/UXO anomaly investigation using the Mag/Dig Approach
- Disposal of any MEC encountered

2 HAZARD/RISK ANALYSIS

The potential health and safety hazards of this project are summarized below in Table 2-1. The potential for encountering these hazards is ranked (high, moderate, or low) based on the work to be performed and the hazard control measures to be used.

Table 2-1 Task Hazards Summary

Summary	Hazard potential [High, Moderate, or Low]	Description of potential hazards
✓ Safety (i.e. Walking and working surfaces, heavy equipment, traffic, falls, excavations, power and hand tools, materials handling, hoisting and rigging, electrical safety, etc.)	Moderate All tasks and their control measures are addressed in Task Specific Activity Hazard Analyses (AHAs).	 Uneven walking and working surfaces Slips, trips, and falls Materials handling Clearing and grubbing operations Possible Unexploded Ordnance (UXO)
_√_Utilities	• Low	Utilities are not anticipated to be encountered
Chemical	• Low	No chemical contaminants are anticipated to be encountered
Physical (i.e. Heat, cold, noise)	• Low	Thermal stressors (variable weather anticipated)
Biological (i.e. Plants, animals, insects, spiders)	• Low	Insect stings and bitesPoisonous animals and plants

The Activity Hazard Analysis (AHA) for the scope of work, identifies potential safety, health, and environmental hazards, and provides for the protection of personnel, the community and the environment. Because conditions may be constantly changing during the course of an investigation project, supervisors must be aware of conditions that may harm site personnel, the community, or the environment. If needed, the Bhate Health and Safety Manager (HSM) will write or approve addenda to modify the AHA. An AHA for the scope of work proposed at the site is presented in Attachment 1 and includes:

- Mobilization/demobilization and site preparation
- MEC/UXO Surface Sweep Operations
- Site clearing and grubbing
- OX/UXO excavation of 15,000 square yards of earth using Earth Moving Machinery (EMM)

- MEC/UXO anomaly investigation using the Mag and Dig Approach
- Installation, filling, and backfilling of the Geotextile Tubes and Scour Aprons

2.1 Task Hazard Description

2.1.1 Safety and Physical Hazards

The site contains a variety of physical safety hazards associated with the excavation equipment, equipment noise, slips, trips, falls, and utilities. Care should be taken to avoid surface debris, slippery surfaces, and unstable terrain and structures. Prior to initiating project activity, the work area will be surveyed to identify these physical safety concerns.

Aboveground utility lines may pose serious safety risks during site activities. Sampling devices may sever or come in contact with concealed electrical lines. If this happens, the sampler or site personnel working nearby may be exposed to electrical shock. Care must be exercised to identify any and all utility lines. No work activity will be conducted adjacent to energized lines.

The following sections describe the tasks proposed at the site, potential hazards, and methods of hazard prevention.

2.1.1.1 Mobilization/Site Preparation/Demobilization/Excavation

Hazards generally associated with mobilization/site preparation/demobilization include the following:

- Manual lifting of equipment
- Material handling
- Slips, trips, and falls
- Heavy equipment operating hazards
- Vehicle safety hazard (traffic accidents)
- Moving the equipment over uneven terrain
- Thunder storms, tornadoes, and lightning strikes

2.1.1.2 Hazard Prevention

- Do not carry personnel or lift anyone except on an approved safety platform.
- Make certain the load can be safely lifted. Employ proper lifting techniques.
- Follow safety procedures on material safety data sheet (MSDS).
- Pick up tools and debris.
- Clean spills immediately, keep work area clean of dirt, grease, debris, and tools.

- Do not walk or climb on equipment not designed as walking surfaces.
- When approaching heavy equipment, make eye contact and signal the operator to cease activity.
- Ensure that heavy equipment has fully functioning safety devices.
- Be aware of the boom swing area and stay clear.
- Provide safety barriers around work areas.
- Wear your seat belt while in a moving vehicle. Follow posted speed limits.
- During thunder storms and lightning, halt activities and take shelter in a building.
- Operate heavy equipment in a safe manner.
- Maintain the equipment in good working condition.

2.1.1.3 Chemical Hazards

According to the *Trenching and Limited Field Investigation Report, Site 7N* (Baker, 2004), the primary contaminants of concern in the landfill are pesticide compounds (4,4'-DDE, alpha-BHC, beta-DHC, alpha-chlordane, and heptachlor epoxide), lead, barium, copper, zinc, arsenic, and mercury. No chemicals associated with military weapons were known to have been used at this site and none are anticipated to be found.

2.1.2 Military Munitions/Unexploded Ordnance Hazards

2.1.2.1 Perform Location Surveys and Mapping

- Exposure to hazards associated with surface MEC/UXO. These items if moved or handled improperly could detonate, either killing or seriously injuring personnel at the work site.
- Exposure to hazards associated with subsurface MEC/UXO while establishing boundaries and driving survey markers in the ground. These items if jarred could detonate, either killing or seriously injuring personnel.
- Biological hazards: exposure to poison oak/ivy or other types of irritating or toxic plant life; exposure to wildlife, rodents, insects, ticks, and snakes which present the possibility of bites and associated diseases.
- Potential trip hazard associated with ground, irregular terrain, cover and vegetation.
- Heat/Cold Stress.

2.1.2.2 Perform MEC/UXO Investigation and Disposal

 Exposure to hazards associated with surface or buried MEC/UXO. These items if moved or handled improperly could detonate, either killing or seriously injuring personnel at the work site.

- Biological hazards: exposure to poison oak/ivy or other types of irritating or toxic plant life; exposure to wildlife, rodents, insects, ticks, chiggers, and snakes which present the possibility of bites and associated diseases.
- Potential trip hazard associated with ground cover, irregular terrain and vegetation.
- Explosion hazard as a result of demolition operations.
- Transportation risks inherent in the movement of MEC/UXO and/or demolition material, and general driving risks.
- Heavy equipment operation hazards inherent in the excavation of MEC/UXO.
- Lifting hazards, such as back strain associated with handling MEC-scrap.
- Heat/Cold Stress.

2.1.2.3 Turn-In of Recovered MEC/UXO Related and Non-Related Scrap

- Exposure to hazards associated with surface MEC/UXO. These items if moved or handled improperly could detonate either killing or seriously injuring personnel at the work site.
- Explosive hazard as a result of inerting/venting MEC/UXO scrap.
- Biological hazards: exposure to poison oak/ivy or other types of irritating or toxic plant life; exposure to wildlife, rodents, insects, ticks, chigger, and snakes which present the possibility of bites and associated diseases.
- Potential trip hazard associated with ground cover, irregular terrain, and vegetation.
- Lifting hazards, such as back strain associated with handling MEC/UXO scrap.
- Heat/Cold Stress.

2.1.2.4 Perform Quality Control

- Exposure to hazards associated with surface MEC/UXO. These items if moved or handled improperly could detonate either killing or seriously injuring personnel at the work site.
- Biological hazards: exposure to poison oak/ivy or other types of irritating or toxic plant life; exposure to wildlife, rodents, insects, ticks, and snakes which present the possibility of bites and associated diseases.
- Potential trip hazard associated with ground cover, irregular terrain, and vegetation.
- Heat/Cold Stress.

2.2 Hazard Control, Accident Prevention

Project personnel will follow the below listed procedures to mitigate the hazards/risks outlined in this addendum:

- Any approach to a suspected MEC will be conducted in accordance with procedures outlined in the U.S. Army Corps of Engineers Pamphlet (EP) 385-1-95a.
- Any MEC found within the confines of the work area will be positively identified by two UXO qualified technicians.
- MEC items will only be moved or handled (when necessary) by qualified UXO/Explosive Ordnance Disposal (EOD) technicians.
- All personnel will wear as minimum Level D personal protective equipment (PPE), sleeves rolled down when scratch hazards exist, leather or canvas work gloves and sturdy work boots. This will minimize contact with potentially irritating and/or toxic plants. In addition to these measures, any person known to have allergic reactions to insect bites or exposure to toxic plants will be identified and will carry appropriate first aid materials at all times.
- While on the job, all personnel will move at a moderate pace and stay alert for possible trip hazards.
- Personnel will avoid, to the maximum extent possible, contact with any wildlife. Should a person become bitten he/she will receive immediate first aid.
- Personnel working in vegetated areas will be reminded to check themselves for ticks and insect bites after leaving the work area.
- While working on site all personnel will use the "buddy" system. Buddies will be assigned each day prior to beginning work. They will remain in sight of each other at all times to ensure safe working practices. During hazardous operations one buddy will act as a safety observer.

2.3 Munitions and Explosives of Concern

These basic safety precautions are the minimum UXO safety requirements required of all personnel on site. Other precautions and requirements are in EP 385-1-95a in Attachment 4 and other applicable UXO manuals referenced in this SSSHP. The following should be taken into consideration when planning or conducting MEC operations:

- Do not move or disturb unidentified items.
- All UXO will be identified independently by two (2) UXO technicians, UXO Tech II or above.
- Do not collect souvenirs.
- Do not smoke except in designated areas
- Do not carry fire or spark producing devices into the site.
- All UXO operations will use the "Buddy" system.
- Prohibit unnecessary personnel from visiting the site.

2.3.1 UXO Safety Precautions during Demolition Operations

The following safety precautions are applicable to all UXO:

- Suspend all operations immediately upon approach of an electrical storm.
- Observe the hazards of electromagnetic radiation (EMR) precautions when working in the vicinity of electrically initiated or susceptible UXO.
- Do not handle any UXO unnecessarily.
- Avoid inhalation and skin contact with smoke, fumes, dust, and vapors of detonations and UXO residue.
- Do not attempt to extinguish burning explosives or any fire which might involve explosive materials.
- Incorporate appropriate property and personnel protective measures for shock and fragmentation when conducting UXO operations.
- Do not subject UXO to rough handling.
- Hand carry no more than two items at a time (one in each hand) and then only as required by the operation being performed.
- Avoid unnecessary movement of armed or damaged UXO.
- Avoid the forward portions of munitions employing proximity fuzing.
- Assume unknown fuzes contain cocked strikers or anti-disturbance features.

2.3.2 General Safety Precautions for Removal Action

- Projectiles
 - Determine if the projectile has been fired and if so consider it armed;
 - Check for the presence of unburned tracers;
 - Avoid the rear and front of rocket assisted and base ejecting projectiles; and
 - Handle projectile components such as powder increments, cartridges, and primers with caution.
- Grenades
 - Do not attempt to re-install safety pins on a dud fired grenade; and
 - Do not attempt to withdraw impinged firing pins from the fuze of a dud-fired grenade.
- Rockets
 - Approach and work on rockets from the side;
 - Do not dismantle or strip dud fired rockets or rocket motors; and
 - Do not expose electrically fired munitions to radio transmissions within 25 feet.

2.4 Other Hazards

2.4.1 Biological Hazards

Site personnel may also be exposed to poisonous plants, animals, and insects. The work area will be visually assessed by the Bhate UXO Safety Officer (UXOSO) for the presence of these dangers. Personnel with admitted sensitivities will not be permitted to work in an area identified as containing the above-mentioned hazards. In the event of an extremely hazardous episode (e.g., snake, spider, or animal bite), the victim will be immobilized and emergency transport will be summoned.

2.4.2 Radiological Hazards

Based on the information available, radiological hazards are not expected to be encountered during the field activities at the site.

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3 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

The following summarizes the health and safety responsibilities of key corporate and project personnel and their lines of authority. It is broken into two parts, one for the installation of the geotextile tubes and the other for the MEC remediation efforts.

3.1 Corporate Personnel

Bhate Corporate Management (Principals, Program Managers, and Project Managers (PM)) ensure that all company activities are executed in accordance with the Bhate Corporate Health and Safety Plan, procedures, and applicable regulations. Site Managers (or the senior company representative at each project site), have the responsibility to integrate loss control principles into all operations and to ensure that:

- All projects are implemented in compliance with all applicable health and safety laws, regulations, and program requirements.
- SSHPs are developed, approved, and implemented in accordance with Bhate and contract requirements. For projects that do not require a SSHP, the requirements of the Bhate Corporate Health and Safety Plan shall be enforced.
- Bhate personnel and subcontractors (as applicable) understand the requirements of the project SSHPs and each individual understands his/her responsibility for plan implementation.
- Personnel have all required training and are capable of performing all assigned tasks.
- Facilities and equipment meet Bhate expectations and government regulations.
- Work rules are enforced.
- Inspections and incident investigations are conducted per program requirements.
- Effective corrective actions are implemented in a timely manner following inspections, audits, incident investigations, etc.
- Clients are notified using Bhate incident reporting procedures.
- Appropriate disciplinary action is implemented when necessary.
- Site Managers promptly address safety problems or issues that employees bring to their attention and involve technical resource personnel as necessary.
- Site Managers provide positive feedback (either verbal or written) to employees who exhibit safe behaviors.

When unsafe behaviors are noticed, managers should:

• Stop work immediately.

- Discuss the behavior with the employee(s), including the possible consequences of such unsafe behavior.
- Document the observations and results of the discussion with the employee for inclusion in the project and/or personnel files.
- Should a behavior result in an incident, report the incident and investigate the root cause in accordance with the Bhate *Incident Reporting and Investigation Procedure*.
- Instruct employees on appropriate safe behaviors.
- When necessary, schedule retraining for employees who appear unfamiliar with safety procedures. Training may be conducted by the manager, qualified peer employees, or other resources as necessary.

Additionally, during MEC remediation projects, only qualified UXO technicians are allowed on site during MEC activities. The UXOSO will perform the role of the UXOSO and the role of the Site Safety and Health Specialist (SSHS) ensuring the safe and healthful conduct of site operations. Ensuring the safe and healthful conduct of operations is the responsibility of everyone assigned to the site, therefore, all Bhate personnel and its subcontractors involved in MEC site activities will be responsible for the following:

- Complying with the SSSHP and all other required safety and health guidelines;
- Taking all necessary precautions to prevent injury to themselves and to their fellow employees;
- Continually being alert to any potentially harmful situation and immediately informing the Senior UXO Supervisor (SUXOS) and UXOSO of any such identified conditions;
- Performing only those tasks that they can do safely and have been trained to do;
- Notifying the UXOSO of any special medical conditions (i.e., allergies, contact lenses, diabetes) which could affect their ability to safely perform site operations;
- Notifying the UXOSO of any prescription and/or over-the-counter medication which they are taking that might cause drowsiness, anxiety or other unfavorable side affects;
- Preventing spillage and splashing of materials to the greatest extent possible;
- Practicing good housekeeping by keeping the work area neat, clean and orderly;
- Immediately reporting all injuries, no matter how minor to the UXOSO;
- Maintaining site equipment in good working order, and reporting defective equipment to the UXOSO; and
- Properly inspecting and using the Personal Protective Equipment (PPE) required by the SSHP or the UXOSO.

3.2 Health and Safety Manager

The HSM, a Certified Industrial Hygienist (CIH), will assist with the development, implementation, and oversight of Bhate's HASP and this SSHP Addendum. This addendum will be signed and dated by the HSM prior to initiation of field activities.

The HSM maintains records of personnel training and certifications and is the first point of contact with Bhate Corporate Management in the event of an accident or incident at the site.

3.3 Site Safety and Health Specialist

The SSHS will functionally report to the PM, with secondary reporting requirements to the Bhate HSM. The SSHS has delegated authority from the HSM and respective corporate management to enforce this SSHP Addendum.

The SSHS is responsible for all aspects of site health and safety. He has the authority and responsibility for stopping site work should activities jeopardize the health and safety of workers or the public. (If practical, the PM and HSM should be consulted before any operation is interrupted.) Additional responsibilities of the SSHS include:

- Provide site orientation safety training for all personnel actively involved in project field work.
- Conduct daily safety briefings.
- Inspect health and safety equipment daily.
- Select protective equipment and clothing in accordance with this SSHP Addendum.
- Confirm worker's suitability for performance of activities.
- Coordinate the project safety and health program with the United States Army Corps of Engineers (USACE) Project Manager.
- Monitor workers for adverse effects of hazardous contaminants.
- Inspect the work areas to ensure compliance with the safety and health requirements for the tasks to be completed and identify hazards.
- Coordinate medical care, as needed.
- Maintain daily exposure data (i.e., man-hours worked, documentation of incidents/injuries).
- Enforce the requirements of this SSHP Addendum.

The SSHS will take the following action(s), as appropriate, and in accordance with this SSHP Addendum:

- Report all safety and/or health related incidences to the HSM and the Bhate PM.
- Order the immediate shut-down of field activities in case of medical emergency or unsafe practice.

• Restrict visitors from areas of potential exposure to harmful substances or hazardous conditions.

The SSHS will maintain a log to document all activities related to safety and health. This log will include daily safety meeting topics, training given, inspection results, first aid administered, visits of outside personnel, environmental monitoring, and documentation of all activities or incidents of a health and safety nature.

Additionally, during MEC operations, the UXOSO/SSHS will:

- Assist in preparation and conduct a final review of the SSHP.
- Provide UXO safety and health consultation to the UXOSO.
- Maintain an alternate line of communication with the President of Bhate Environmental Associates, Inc.

3.3.1 Senior UXO Supervisor

The SUXOS for this project will be determined upon receipt of the notice to proceed with field activities. The SUXOS reports directly to the Project Manager on issues pertaining to the operations at the project site. The SUXOS will have the following safety and health related responsibilities:

- Reports directly to the Project Manager.
- Managing the funding, manpower and equipment necessary to safely conduct site operations.
- Reviewing and becomes familiar with the site WP and SSHP.
- Furnishes copies of the WP and SSHP to site and subcontract personnel for their review.
- Reviewing the Standard Operating Procedures (SOP) and ensuring that the required safety and health elements are addressed in the SSHP and/or WP.
- Coordinates the assignment of personnel and ensures that the personnel and equipment provided meet the requirements of the WP and SSHP.
- Ensures implementation of project quality and safety and health procedures.
- Performs early detection and identification of potential problem areas, including safety and health matters, and institutes corrective measures.
- Directly interfaces with the United States Army Corps of Engineers (USACE) Site Representative and advising him/her of safety and health matters related to conduct of the site operations.
- Acts as the alternate On-Scene-Incident-Commander (OSIC) in the event of an emergency, notifying and coordinating with off-site emergency and medical response agencies.

3.3.2 UXO Safety Officer

Mr. Tim King is the UXO Safety Officer (UXOSO) for this project. He reports directly to the Corporate Safety and the SSHS, and oversees all safety and health aspects of the MEC remediation portion of this project. See resume in Appendix I of the UXO Work Plan for qualifications and experience. He will coordinate all daily activities with the SUXOS. The UXOSO will have the following responsibilities:

- Has STOP WORK authority for safety and health reasons;
- Complete Personnel Data Sheets on all site personnel;
- Implement and enforce the SSHP, and report safety violations to the SUXOS and other appropriate personnel;
- Establishing work zones and controlling access to these zones;
- Confirm all contractor and subcontractor personnel's suitability for work, based upon OSHA and site specific medical and training requirements;
- Conduct daily General Safety Briefings;
- Implement and document the Site Specific Hazard Information Training Program (as specified by 29 CFR 1910.120);
- Ensure proper condition, maintenance, storage, and use of PPE;
- Selects the PPE for specific task or operations;
- Consulting with Bhates' CIH and HSM prior to downgrading or altering monitoring procedures or PPE requirements;
- Assisting in the continued development of the SSHP and other safety and health procedures;
- On-site enforcement of the Alcohol/Drug Abuse Policy;
- Investigate accidents/incidents and "near misses";
- Conduct visitor orientation;
- Enforce the "buddy" system;
- Conduct and document daily safety inspections, and weekly safety audits;
- Maintain and calibrate safety monitoring equipment, and document calibration data in the monitoring or safety log;
- Restrict site personnel from site activities if they exhibit symptoms of alcohol or drug use or illness, and continually monitor site personnel for signs of environmental exposure or physical stress;
- Maintain the site safety and monitoring logs;
- Act as the OSIC in the event of an emergency, notify and coordinate off-site emergency and medical response agencies;

- Post the descriptions and maps associated with hospital and emergency evacuation routes;
- Conduct on-site safety orientation and operational review during the first working day at the project site; and
- Maintains a direct line of communication with the Safety and Health Manager.

3.3.3 UXO Quality Control Specialist

For this project, the UXOSO and UXO Quality Control Specialist (UXOQCS) will be the same person. He will report directly to the Corporate Quality Control (QC) Manager and coordinate daily activities with the SUXOS. The UXOQCS has the following responsibilities:

- Reviewing, implementing, and enforcing the QC plan;
- Coordinating with the USACE Quality Assurance (QA) representative to ensure QC objectives are appropriate for the task being performed;
- Coordinating with the QC Manager to ensure QC procedures are appropriate in demonstrating data validity sufficient to meet QC objectives;
- Conducting QC inspections and audits of documents, work in progress, work performed, and monitoring.
- Recording and reporting the results of inspections to the appropriate personnel;
- Recommending to the SUXOS any actions to be taken in the event of a QC failure;
- Advising the SUXOS on all QC related site matters;
- Reporting non-compliance with QC criteria to the SUXOS, Project Manager and the QC Manager; and
- Has STOP WORK authority for issues regarding QC at the project site.

3.3.4 UXO Technician III

The UXO Technician III is responsible for the direct supervision and safety of the personnel under his/her control and reports to the SUXOS. He/she is responsible for ensuring that all work accomplished and all personnel comply with the WP, SSHP, and all applicable Federal, State, and local regulations. The UXO Technician III may conduct additional safety meetings and training as needed. He/she shall report all safety violations and accidents/injuries to the UXOSO.

3.3.5 UXO Technicians

All UXO Technicians II and UXO Technicians I are required to comply with the provisions of this SSHP, the WP and all applicable Federal State and local regulations. They will report to the UXO Technician III.

3.4 Project Manager

The PM is the senior Bhate representative for the project. The PM reports directly to Bhate corporate management, and site contacts. The PM is committed to the overall success of the project, including performance of all site work in accordance with this SSHP Addendum. The PM is responsible for the preparation, organization, and review of the SSHP Addendum and is responsible for the selection, assignment, and conduct of site personnel. The PM coordinates field activities with appropriate site contacts and coordinates preparation of the project deliverables. The PM has overall responsibility for the health and safety of Bhate personnel and Bhate subcontractors working onsite. If the PM is not available, the Program Manager will assume the Project Manager responsibilities.

3.5 Subcontractors and Suppliers

Bhate will be responsible for overall health and safety of contractor and subcontractor employees. Bhate will enforce the requirements of this SSHP Addendum for project personnel. Bhate's subcontractor will be required to comply with the requirements of this SSHP Addendum and EM 385-1-1, and the OSHA standards contained in 29 CFR Parts 1910 and 1926. The subcontractor will also be responsible for site safety related to, or affected by, their operations and actions.

Each subcontractor employee is responsible for his own safety as well as the safety of those around him. The employee will use all equipment provided in a safe and responsible manner as directed by the SSHS. All site personnel will follow the policies set forth within this SSHP Addendum.

3.6 Responsibilities of all Site Personnel during MEC Remediation Operations

Ensuring the safe and healthful conduct of site operations is the responsibility of everyone assigned to the site, therefore, all personnel involved in site activities will be responsible for safety during operations involving MEC remediation of dangerously hazardous situations which could involve the loss of life and/or limbs during an accident or incident involving MEC. Because of this unique nature, it is paramount that everyone on site acts as a primary and secondary safety representative and adheres to the following guidelines without failure:

- Comply with the SSHP and all other required safety and health guidelines.
- Take all necessary precautions to prevent injury to themselves and to their fellow employees.
- Continual alertness to any potentially harmful situation and the need to immediately inform the SUXOS and/or UXOSO of any such conditions.
- Perform only those tasks that they believe they can do safely and have been trained to do.
- Notify the UXOSO of any special medical conditions (i.e., allergies, contact lenses, diabetes) which could affect their ability to safely perform site operations.

- Notify the UXOSO of any prescription and/or over-the-counter medication which they are taking that might cause drowsiness, anxiety or other side affects.
- Prevent spillage and splashing of materials to the greatest extent possible.
- Practice good housekeeping by keeping the work area neat, clean and orderly.
- Immediately report all injuries, no matter how minor to the SUXOS and UXOSO.
- Maintain site equipment in good working order, and report defective equipment to the SUXOS or UXOSO.
- Report to work clean shaven, if required to use respiratory protection.
- Properly inspect and use the PPE required by the SSHP or the UXOSO.

4-1

4 TRAINING

4.1 Safety Indoctrination

Site-specific training concerning site hazards, general health and safety procedures, and the contents of this SSHP Addendum will be performed by the SSHS for all Bhate and subcontractor onsite project personnel before field work can commence. This will consist of a review of the specific hazards of concern, risks, symptoms of exposure, and an overview of this SSHP Addendum to include access to confined spaces, safety procedures, atmospheric testing, and emergency contacts.

4.2 Training Requirements

4.2.1 General Training Requirements

Though the project does not meet the general criteria associated with hazardous waste work, all personnel performing onsite work activities, wherein they may be exposed to hazards resulting from field activities, will have completed applicable training in compliance with 29 CFR Part 1910/29 CFR Part 1926 and EM 385-1-1. Table 4-1 provides a summary of the minimum training requirements for site project personnel.

Table 4-1. Required Worker Training and Site-Specific Training

-	Required worker training	Site-specific training requirements	
1	40-hour General Site Worker	All personnel working onsite shall attend site-	
1	8-hour Supervisor (as applicable)	specific orientation/training prior to starting onsite project work. This training will be facilitated by the SSHS.	
1	3-Day On-the-Job		
√ 8-hour Refresher (as applicable)			
No retra	nining requirements are anticipated during the project.		

Additionally, at a minimum, the SSHS will be certified in First Aid, Cardiopulmonary Resuscitation (CPR), and Blood Borne Pathogens, and will be continuously present during site operations.

4.2.2 UXO Technician Training Requirements

All Bhate UXO personnel working on site have completed United States Naval Explosive Ordnance Disposal (USNAVSCLEOD) or Department of Defense (DOD) recognized training programs which detail procedures for evaluation and disposal of UXO. All personnel performing field activities on-site from Bhate have received 40 hours of initial OSHA health and safety training in accordance with the provisions of 29 CFR §1910.120(e). Bhate's personnel

have also received 8 hours of refresher training or Supervisors refresher training on an annual basis as needed. The OSHA training includes the doffing and donning of PPE. Field personnel are also appropriately trained in first aid and CPR. At least two personnel trained in first aid and CPR will be present on-site during field operations. Re-certification in first aid will be done every 2 years and re-certification for CPR will be annually. All UXO training records are kept on file at Bhate's OE Director's office. Copies of training certificates will be provided to the UXOSO.

4.2.2.1 Site Specific Training

The UXOSO is responsible for developing a site-specific occupational hazard training program. This training will take place prior to the commencement of work and for duration necessary to complete the required training. The UXOSO is responsible for providing training to all on-site personnel. This training will cover the following topics:

- Names of personnel responsible for site safety and health;
- Safe work practices;
- Site history;
- Safety, health, and other hazards at the site;
- Work zones and other locations;
- Emergency procedures, evacuation routes, emergency phone numbers;
- Proper use of PPE;
- Safe use of engineering controls and equipment on site; and
- Prohibitions in areas and zones, including: site layout and procedures for entry and exit or work areas and zones.

4.2.2.2 Additional Training/Meetings

Safety training will be provided each morning on-site at the daily safety meeting. The safety and health considerations for the day's activities will be reviewed. Additional training will be conducted when circumstances dictate. The daily meeting will address that day's activities; safety issues; specific hazards; and emergency procedures, to include:

- Notification procedures and phone numbers.
- Rally points, and safe areas.
- Hospital and evacuation routes.
- Emergency equipment.
- Changes in PPE or safety procedures.

The week's safety and health considerations for the site will be reviewed. Changes, recommendations, concerns, or violations will be briefed by the UXOSO. This meeting is documented and shall include subjects covered and personnel attending.

4.3 Emergency Response Training

For this scope of work, Bhate and their subcontractor will rely on the local emergency services to respond to emergency situations. The SSHS shall verify the means to summon emergency rescue, fire fighting, and medical services.

5 LOGS, REPORTS, AND RECORD KEEPING FOR MEC REMEDIATION OPERATIONS

5.1 Safety Log

The UXOSO will maintain a safety log of all safety related site activity. The UXOSO is responsible for ensuring that safety and health activities and events for the day are part of the log. The log may include the minutes of the tailgate safety meeting, or the meeting may be documented on the Tailgate Safety Briefing form. As a minimum, the safety log should reference the tailgate safety briefing, and mention: accidents, near misses, internal and external audits, the reason for and duration of safety related "stop work" orders, and any other issues pertaining to site or personnel safety or health.

5.2 Injury/Illness/Accident Reports

In the event that a reportable injury/illness/accident occurs at the job site, a Bhate accident report will be completed and forwarded within two working days to the Bhate home office. Accidents will be reported in accordance with the Bhate Environmental Associates, Inc., Employee Injury Report located in Appendix A of the UXO Work Plan and will be maintained on site by the UXOSO. If a near miss occurs the UXOSO will investigate the near miss and report the results of the investigation to the Bhate home office and the SUXOS and the Navy notified.

5.3 Training Log

The UXOSO is responsible for ensuring that all training conducted relative to job site activities is documented in the Training Log and/or on the appropriate training forms. This log will include the initial site-specific training conducted prior to the start of site activities. The UXOSO will maintain this log and any associated training forms on-site so they will be available for inspection.

5.4 Equipment Maintenance Log

Required scheduled maintenance and calibration of equipment performed will be annotated in the SUXOS Daily Journal.

5.5 Visitor Log

The UXOSO will be responsible for maintaining the visitor log that will be used to record the entry and exit of all visitors, including Federal, state or local officials who visit the site. This log will reflect name, organization, date, and time of visitor entry/exit. Visitors will be briefed on:

- This SSHP Addendum;
- Restricted and safe areas;

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- Site hazards and risks to include MEC, biological, heat/cold, and trip hazards;
- PPE required and use;
- Fire and MEC safety requirements; and
- Site evacuation and emergency procedures.

6 PERSONAL PROTECTIVE EQUIPMENT

Table 6-1 lists the minimum PPE that will be used for this scope of work.

Table 6-1 Personal Protective Equipment by Activity

Activity	Head/Face	Foot	Hands	Respiratory	Clothing
Mobilization / Demobilization	Hard Hat (for overhead hazards), Safety Glasses with rigid side shields	Steel toed boots	Leather gloves as needed	None	Minimum of long pants and shirts with a minimum 4-inch sleeve
General Site Labor	Hard Hat (for overhead hazards), Safety Glasses with rigid side shields	Steel toed boots	Leather gloves as needed	None	Minimum of long pants and shirts with a minimum 4-inch sleeve

Note:

- Safety Glasses with rigid side shields approved by American National Standards Institute (ANSI) Z-87 required at all times.
- Hard hats are not required inside fully enclosed equipment cabs.
- Disposable PPE (i.e. Tyvek coveralls, boot covers, chemical resistant gloves, etc.) may be utilized for the purpose of maintaining cleanliness during any phase of the work.
- Excessive noise will be considered to be the level at which two persons with normal hearing, standing at arms length, cannot converse in normal tones and will require the use of hearing protective devices.
- Additional PPE may be included in the AHAs.
- Steel toed boots and hard hats are not to be worn by UXO Technicians during MEC excavation, investigation, and disposal operations.

The following qualified person certifies that the selection of PPE is based on best available information about the work requirements and anticipated hazards.

Printed name:	Signature:	Date:
Judy McBride, CIH Bhate Health and Safety Manager		

As indicated in Table 6-1, respiratory protection is not expected to be required during the project activities. If required, respirators will be specified according to the hazard. All personnel who may be required to wear a respirator during any phase of site activities must comply with the requirements of the Bhate Respiratory Protection Program. Respiratory protection users must participate in a medical monitoring program and be physically capable of performing the required work activities, they must have received training in the use of, and have been fit tested for the respiratory protection selected.

7 MEDICAL SURVEILLANCE

A medical surveillance program established for hazardous waste work will be followed. The purpose of the medical surveillance program is to detect deleterious consequences of occupational exposure to hazardous substances and physical stresses, particularly those associated with the work environment at hazardous waste sites. The medical surveillance program is designed to monitor specific physiological conditions and mechanisms that may be affected by chronic exposure, as well as to provide acute medical care as needed. The medical surveillance program is also intended to ensure that employees are medically fit to perform site tasks. All personnel working on the site will have had a pre-employment and current annual physical examination in accordance with 29 CFR §1910.120 (f)/29 CFR §1926.65 (f) conducted by an occupational health physician and, on the basis of this examination, will have been certified as being fit for duty on potentially hazardous sites.

8 HEAT STRESS AND COLD STRESS

8.1 Heat Stress

Employees who are not acclimatized or wearing impermeable personal protective clothing have a greater likelihood of experiencing heat stress. Appropriate monitoring should be initiated when the temperature exceeds 70 degrees Fahrenheit (°F).

8.1.1 Action Levels

If it appears the day will be warmer than 70°F, the SSHS shall ensure that a sufficient supply of cool water is available for workers. The SSHS will encourage employees to drink more than what is required to satisfy their thirst, since thirst satisfaction is not an adequate indicator of adequate fluid replacement. When temperatures are predicted to be greater than 80°F, the SSHS will implement Wet-Bulb Globe Thermometer (WBGT) monitoring.

When it is forecasted that ambient temperatures will exceed 90° F, two water coolers will be made available at the site and will be located near the work and break areas. The SSHS will also evaluate changing the work schedule to take advantage of cooler morning temperatures. Table 8-1 provides a summary of the ambient temperature and action levels.

Temperature	Recommended Action
>70°F	Have drinking water and/or dilute electrolyte solution available at the site.
>80°F	Implement WBGT Monitoring.
>90°F	Provide two water coolers at the work site. Position near the work and break areas. Evaluate changing work schedule to take advantage of cooler morning hours.

Table 8-1. Action Levels- Normal Temperature (Ambient)

8.1.2 Permeable Clothing

Monitoring should be initiated whenever the ambient air temperature is expected to exceed 80°F. For workers dressed in permeable clothing, monitoring will consist of evaluating the WBGT in accordance with the most current American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices book. Action levels have been established for site operations and are included in Table 8-2.

It is thought that the following action levels will adequately protect the majority of workers under normal circumstances. However, it should be noted that individual susceptibility to heat related injuries are affected by a variety of factors such as age, physical fitness, sex, and

acclimatization. Because of the individual nature of susceptibility, each worker should be aware of the symptoms of heat related injuries. If they notice symptoms, in themselves or coworkers, they should bring it to the attention of the SSHS so that preventive measures action can be taken.

Whenever temperatures exceed 80°F, the SSHS will check the WBGT temperature hourly. Where an increase/decrease to a different action level, the SSHS will record the time and WBGT reading on a Heat Stress Monitoring Data Sheet.

Table 8-2. Action Levels- WBGT for Site Operations

WBGT Temperature (°F)	Recommended Action
>86°F Unacclimated Workers >82°F	Notify workers that environmental conditions, as measured by the WBGT, may contribute to the potential for heat related injuries. Water should be readily available. Recommend workers intake average 1 cup of water for every 15 minutes of work. Each team member should pay particular attention to whether they or other workers exhibit noticeable symptoms of heat exhaustion or heat stroke. If symptoms are noted, treatment and corrective action should immediately be taken.
>88°F Unacclimated Workers >83.5°F	In addition to action taken at WBGT of 86° F. Adjust the work-rest regime should so that 75% is spent in physical activity and 25% rest. This can be accomplished by slowing the operation down thereby increasing rest already associated with the process and/or taking scheduled breaks as needed. The work pace, the number of breaks, and their duration will be left to the discretion of the SSHS.
>90°F Unacclimated Workers >85.5°F	In addition to action taken at lower temperatures, notify employees that moderate heat stress conditions exist. Individuals involved in heavy physical activity should exercise greater caution. Decrease the work-rest regime as necessary by increasing rest (operational process and scheduled breaks) to 50% per hour. When feasible, breaks should be taken in a cooler environment, i.e. air-conditioned truck cabs or field office.
>92°F Unacclimated Workers >87.5°F	In addition to action taken for lower temperatures, decrease the work-rest regime to 25% work and 75% rest. Notify workers of the high hazard condition. The SSHS will monitor worker's water intake to ensure a minimum of 1 cup of water is being consumed for every 15 minutes of work.

In cases where a WBGT monitor is not available, workers will be required to measure and record their heart rates. The monitoring frequencies, as summarized in Table 8-3 for permeable clothing, are based on the adjusted temperature which is defined as the ambient temperature plus 13 times the percent sunshine, ${}^{\circ}F.adj = {}^{\circ}F. + (13 \text{ X \% sunshine})$. Where 100 percent sunshine would equal no cloud cover and a sharp, distinct shadow and zero percent sunshine would equal conditions where there are no shadows.

To determine their heart rate, workers will count their radial pulse for 30 seconds as early as possible in the rest period. If the heart rate exceeds 110 beats per minute (bpm) at the beginning of the rest period shorten the next work period by 1/3 and keep the rest period the same. If the

heart rate exceeds 110 beats per minute at the next rest period, shorten the following work period by 1/3. The adjusted temperature and heart rates will be recorded in the Field Log. Workers should also record their resting heart rate before work begins.

8.1.3 Impermeable Clothing

Whenever workers are required to wear impermeable clothing such as Tyvek, initial monitoring and frequency will be determined by the Adjusted Temperature. A baseline heart rate, for workers required to wear impermeable clothing, shall be recorded whenever the ambient air temperature is expected to be greater than 59°F during the shift. The SSHS will be responsible for documenting each worker's heart rate, determining and initiating additional monitoring at the appropriate frequency, and establishing an appropriate work/rest ratio for each worker in accordance with the schedule presented in Table 8-3.

Adjusted Temperature Impermeable Clothing **Normal Work Clothing** 90° F or above After each 45 minutes of work After each 15 minutes of work $87.5^{\circ} - 90^{\circ} F$ After each 60 minutes of work After each 30 minutes of work $82.5^{\circ} - 87.5^{\circ} F$ After each 90 minutes of work After each 60 minutes of work $77.5^{\circ} - 82.5^{\circ} F$ After each 120 minutes of work After each 90 minutes of work $70^{0} - 77.5^{0} \,\mathrm{F}$ After each 150 minutes of work After each 120 minutes of work

Table 8-3. Schedule for Physiological Monitoring Frequency – Impermeable Clothing

8.1.4 Noticeable Symptoms

Workers shall be aware of the signs of heat stress such as fatigue, extreme sweating, or disorientation. If these symptoms are noted, the SSHS shall be notified and corrective action taken, i.e. hydration, shortening work periods, and providing a shaded work area.

8.1.5 Unacclimatized Workers

Special attention should be paid to unacclimatized workers since they may be more susceptible to heat related injury. Acclimation can take as long as two weeks for some workers. Workers coming back from extended periods (longer than 4 days) away from the job, such as a vacation, extended weekend, etc. may also have a higher susceptibility.

8.1.6 Water and Salt Supplementation

During the hot weather, drinking water should be made available to workers in such a way as to encourage them to drink frequently small amounts, i.e., one cup every 15 to 20 minutes. Water should be kept reasonably cool, 50°F to 60°F and should be placed close to the work area so that

the worker can reach it without abandoning the area. Providing "salted" water is unnecessary, however, during prolonged hot spells workers may choose to generously salt their food.

8.2 Cold Stress

The potential for cold stress during the performance of this work is minimal during most parts of the season. The SSHS will control exposures to cold temperature extremes in accordance with the ACGIH Cold Stress Threshold Limit Values (TLVs). In general, the SSHS will follow these procedures to reduce the potential for cold stress, as necessary:

- Provide a warming area for site personnel.
- Provide warm, sweet drinks and/or soups at the work site to provide caloric intake and fluid volume. Note: The intake of coffee should be limited because of diuretic and circulatory effects.
- Rotate shifts of workers.
- Require workers to change into dry clothing should they become wet.
- Carefully schedule work and rest periods.

Monitor workers' physical conditions.

9 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

All site personnel will follow the following general safety rules. These precautionary measures are designed to reduce the risks of inadvertent or accidental injury or chemical exposure during onsite operations. Failure to comply with these general safety rules, requirements of the SSHP Addendum, and the requirements of the Bhate's HASP may result in removal from the project and disciplinary action in accordance with Bhate's Disciplinary Action for Personal Safety Violations Procedure.

- 1. All site personnel must attend the Daily Safety Briefing.
- 2. Be familiar with standard operating procedures and adhere to all instructions and requirements in the SSHP Addendum.
- 3. Any individual taking prescribed drugs shall inform the SSHS of the type of medication. The SSHS will review the matter with the HSM, as necessary, who will decide if the employee can safely work onsite while taking the medication.
- 4. Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. While field operations are in effect, alcoholic beverage intake should be minimized or avoided during off-work hours. Personnel performing onsite operations should not take prescribed drugs where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Do not work when ill.
- 5. The personal protective equipment specified by the SSHP Addendum shall be worn by all site personnel.
- 6. Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the work area. (Exceptions may be permitted by the SSHS to allow fluid intake during heat stress conditions.)
- 7. All lighters, matches, cigarettes, and other forms of tobacco are prohibited in the work area.
- 8. All signs and demarcations shall be followed. Such signs and demarcations shall not be removed except as authorized by the SSHS.
- 9. No one shall enter a permit-required confined space without a permit. Confined space entry permits shall be implemented as issued.
- 10. All personnel must follow Hot Work Permits as issued.
- 11. All personnel must follow the work-rest regimens and other practices required by the heat stress program.
- 12. Rest breaks shall be taken in approved locations.
- 13. All personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.
- 14. No person shall operate equipment unless trained and authorized.

- 15. No one may enter an excavation greater than four feet deep unless authorized by the Competent Person. Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.
- 16. Ladders and scaffolds shall be solidly constructed, in good working condition and inspected prior to use. No one may use defective ladders or scaffolds.
- 17. Fall protection or fall arrest systems must be in place when working at elevations greater than six feet for temporary working surfaces and four feet for fixed platforms.
- 18. Safety belts, harnesses, and lanyards must be selected by the SSHS. The user must inspect the equipment prior to use. No defective personal fall protection equipment shall be used. Personal fall protection that has been shock loaded must be discarded.
- 19. Hand and portable power tools must be inspected prior to use. Defective tools and equipment shall not be used.
- 20. Ground fault circuit interrupters (GFCIs) shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out of walkways and puddles unless protected and rated for the service.
- 21. Improper use, mishandling, or tampering with health and safety equipment and samples is prohibited.
- 22. Horseplay of any kind is prohibited.
- 23. Possession or use of alcoholic beverages, controlled substances, or firearms on any site is forbidden.
- 24. All incidents, no matter how minor must be reported immediately to the SSHS.
- 25. All personnel shall be familiar with the Site Emergency procedures.

The SSHS will conduct daily informal safety and health inspections of their active field work areas. The inspection shall cover workplace conditions, physical area safety, and employee work practices. The SSHS shall document any deficiencies and corrective actions in a field logbook.

This scope of work does not contain any activities, such as excavation or scaffolding, that require the inspection services of a competent/qualified person as defined by OSHA.

10 SITE ORGANIZATION AND CONTROL

10.1 Work Zones

To prevent migration of contamination caused by personnel or equipment, work areas and personal protective equipment (PPE) will be clearly specified prior to beginning operations. Work areas or zones will be designated.

The work area will be divided into the following three zones:

- Support Zone
- Contamination Reduction Zone
- Exclusion Zone

In addition, on-site and off-site traffic patterns will be designated, as well as, stockpile area(s) and decontamination pad (if necessary), water sources identified, and coordination with the Station Fire Department.

10.1.1 Support Zone

Bhate will establish the Support Zone (SZ) adjacent to Cabins 169 and 170. The support zone will serve as a staging area outside the immediate work area.

10.1.2 Contamination Reduction Zone

Bhate will establish a Contamination Reduction Zone (CRZ) inside the entrance to the geotextile tube installation area from the SZ. In the CRZ personnel will remove any disposable PPE and place it into lined receptacles for disposal as non-hazardous debris.

10.1.3 Exclusion Zone

The exclusion zone (EZ) will include the geotextile tube installation area including the upland bank, the clearing and grubbing area, and any stockpiles. Bhate will install a temporary, high-visibility barricade fence at the limits of each exclusion zone to restrict access to unauthorized personnel. A temporary gate will be established at the entrance of the EZ to restrict vehicular access to authorized personnel only. The Bhate superintendent and SHSS will monitor and control exclusion area access. Activities within the exclusion area will conform to the SSHP. The high-visibility fence will be removed at the completion of geotextile tube installation.

10.2 On-Site Traffic Patterns

Due to limited sight distances caused by uneven terrain, Bhate will establish defined routes for material handing and movement around the site. Where necessary, Bhate will employ spotters to guide heavy equipment operators and vehicles transporting materials in tight work areas. A

general traffic pattern for the site will be established and will be communicated in advance to field personnel.

10.3 Off-Site Traffic Control

Bhate will conform to NWS Yorktown requirements with respect to controlling unauthorized vehicle access into the site. In addition, Bhate will coordinate any required roadway closures with the Resident Officer In-Charge of Construction (ROICC) and the appropriate department(s) at NWS Yorktown. Haul routes through the NWS Yorktown, CAX will be approved in advance by the ROICC.

10.4 Site Control during MEC Remediation

The UXOSO coordinates access control and security on site. Due to the hazardous nature of MEC only authorized personnel will be allowed in the EZ. The EZ is the work site, encompassing an area large enough to prevent personnel injuries from fragmentation resulting from either unintentional or intentional detonations of UXO.

During all intrusive operations the EZ will be a radius of 200 feet minimum. The munitions with the greatest fragmentation distance (MGFD) will determine the fragmentation zone for unintentional detonations, or Minimum Safe Distances (MSD) as calculated by the USACE. The EZ will be adjusted if UXO is encountered which is inconsistent with the calculated fragmentation hazard of the UXO. During demolition operations the EZ will be maintained in accordance with the demolition standard operating procedures. The limits of the EZ will be marked with visual, suitable marking material. During UXO operations, only UXO trained or authorized essential personnel are allowed in the EZ. Authorized personnel are those that have completed the required training and meet medical requirements.

Visitors will report to the SUXOS or UXOSO. During all operations on individual sites, the site UXO Technician III will cease operations if non-essential personnel are observed within the operating area. During duty hours personnel will provide security at the individual sites. Equipment will be returned to a designated area and secured at the end of the workday.

Representatives from regulatory agencies will be permitted to enter the site at any time during business hours or any other reasonable times provided they have completed the required training and meet medical requirements. Further site controls to ensure safety are as follows:

- Eating, drinking, and smoking are prohibited except in designated areas.
- Hazardous MEC operations (intrusive investigations and demolition) will cease if non-UXO trained personnel are present.
- The SUXOS or UXOSO will escort all authorized visitors to the site.
- All personnel entering the site, including visitors, will be in the proper PPE.

- The UXOSO will maintain the site entry control log to ensure accurate accountability for personnel.
- The UXOSO will brief this SSHP to all personnel entering the site to inform them of the potential site hazards. All personnel will acknowledge this briefing by signing the SSHP briefing log.
- In case of an emergency, personnel will exit the site and move to the designated safe area. The safe area will be located upwind of the site outside of the fragmentation area. The UXOSO will determine the severity of the emergency. If the emergency warrants evacuation, the UXOSO will notify the SUXOS.

11 EQUIPMENT DECONTAMINATION

11.1 Decontamination Pad

If necessary, decontamination pads will be constructed of polyethylene sheeting and placed under trucks and equipment in the CRZ. Decontamination pads will be constructed to contain rinse waters. The pads will be constructed so that they can be moved to other areas as needed.

11.2 Water Source for Decontamination Activities

A source of non-potable water may be necessary for pressure washing of truck tires and washing of some of the larger equipment. Bhate will coordinate with the ROICC and the Station Fire Department to locate a source for water near the site. If no water source is available near the site, Bhate will arrange for the use of temporary containers such as water trucks or plastic storage tanks to store non-potable water for use in decontamination activities.

12 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

12.1 First Aid Equipment and Supplies

All individuals will be familiar with the site and be able to identify the location of the following required emergency equipment:

- First aid kit(s)
- Fire extinguisher(s), Type ABC
- Portable telephone or two-way radio
- Emergency Eyewash

First aid kits will be maintained for immediate care cases. Also, a first aid kit will be maintained in the support zone.

12.2 Spill Control Materials and Equipment

No spills are expected to occur during this project.

The site will be equipped with a spill kit, sufficient to contain and clean up on-site quantities of petroleum products. In the event of a spill, Bhate will notify the ROICC.

12.3 Fire Extinguishers

Fire extinguishers will be provided for site work. Listed below are the classes of fires that have a potential to occur due to the materials at the site.

Class A: A fire involving ordinary combustible materials such as wood, paper, clothing, and some rubber and plastic materials.

Class B: A fire involving flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

Class C: A fire involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media.

13 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

The SSHS will be responsible for coordinating any emergency response actions during the project. Bhate will consult with the Navy to determine the requirements for placing the Station Fire Department on Stand-by status during site activities. In addition, Bhate will implement on-site fire protection measures specified by the Navy. In the event that a member of the field crew is injured, experiences any adverse effects or symptoms of possible exposure (chemical or physical) while onsite, the entire field crew will immediately halt work and act according to the instructions provided by the SSHS. The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated will result in the evacuation of the field team and reevaluation of the hazard and the level of protection required. If an emergency situation develops which requires evacuation of the work area, the evacuation procedures in Table 13-1 shall be followed.

Evacuation StepMethods and CommentsNotify affected workersUse of site communication methods as applicableEvacuate to safe locationAssemble at the primary evacuation site (outside of the work area)Assemble and account for workersSSHS shall account for personnel using Daily Safety Meeting LogNotify Fire and Emergency ServicesNotification as neededComplete incident reportFollow the Incident Reporting and Investigation Procedure

Table 13-1. Evacuation Procedures

Table 13-2 summarizes potential emergency situations and response actions that are applicable for the project.

In the event of an emergency, local sources of assistance will be utilized. Prior to the commencement of the work, the SSHS will familiarize the field team with the locations of the closest hospitals. Contacts, phone numbers, and facilities for emergency use are provided in Appendix C of the UXO Work Plan.

Table 13-2. Potential Emergency Situations

In Case of	Response Actions
Injury or illness	Treat injury with applicable First Aid. All work related injuries beyond first aid will result in notification of Emergency Services and notification of the employee supervisor. Any employee requiring advanced medical treatment will be accompanied by a knowledgeable company employee that can answer potential questions on job duties and hazards. Make notifications in accordance with the Incident Reporting and Investigation Procedure.
Chemical exposure	First Aid shall be provided such as but not limited to: move victim to fresh air, remove contaminated clothing, flush affected skin with water, and seek medical attention.
Fire or explosion	Notify emergency services immediately. All personnel shall evacuate the immediate area of the fire and move to an upwind location. Personnel shall not engage in fire fighting activities (use of fire extinguisher) unless trained to do so and only in the incipient stages of fire. It is essential that the site be evacuated and no one is allowed to re-enter, except to possibly save a life, until at least 30 minutes or longer if necessary, after the explosion. The OSIC will determine what actions, if any, are appropriate.
Adverse weather	Tornados, lightning, or other threatening weather conditions will result in an immediate shut down of operations and evacuation of personnel. Lightning proximity will be determined by measuring the time interval between the visually observed lightning flash and the subsequent sound of thunder. An interval less than 30 seconds will prompt the shut down. Operations will be shut down for the period of the storm passing plus an additional 20 minutes.
Material spill or release	Vehicles and equipment will be maintained and inspected so as to prevent fluid leaks. Should any vehicle fluid leaks occur, the equipment will be taken out of service to make necessary repairs and any contaminated material will be cleaned up and disposed of properly. Spill kits will be available to facilitate prompt containment and clean-up of spills. Notification will be made in accordance with the Incident Reporting and Investigation Procedure.

14 REFERENCES

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APPENDIX D - ATTACHMENT 1 ACTIVITY HAZARD ANALYSIS



Activity Hazard Analysis (AHA) - 01

Task: Shoreline Stabilization			Bhate Project Number: 9030080	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)			Location: Cheatham Annex, Yorktown, Virginia	
			Analysis Approved by: Judy McBride, CIH	Date: January 2006
Activity	Potential Hazards		Recommended Controls	
Mobilization/Demobilization and Site Preparation General precautions presented in this section apply throughout site operations (i.e. slips, trips, and falls, thermal stressors, materials handling, inclement weather, etc.)	Slips, trips, or falls on walking and working surfaces	 Continuous Pay attentio Maintain cle Be alert for 	he best access route prior to transporting equipment y inspect the work area for slip, trip, and fall hazar n; ensure safe and secure footing can work areas by following good housekeeping pruneven and variable terrain sistant footwear when walking/working on slipper	ds ocedures
	Site Traffic Eye injury Overhead hazards	Follow postedUse approvedPersonnel wil	otential vehicle traffic while on site I warnings and rules for travel around site safety glasses with rigid side shields I be required to wear hard hats that meet American Nard Z89.1 in all areas with overhead hazards	Vational Standards Institute
	Cuts, punctures, and abrasions Dropped objects	Wear leather work gloves when handling materials or using tools Steel toe boots meeting ANSI Standard Z41 will be worn		
	Thermal Stressors (i.e. heat stress, cold stress)	Employees will have appropriate clothing for variable weather Use of long sleaves or application of superseen with a high sup protection factor (SPE) on		

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exposed skin encouraged

• Use of long sleeves or application of sunscreen with a high sun protection factor (SPF) on

• Employees will take breaks and drink plenty of fluids, as necessary, to prevent heat stress

• Warming breaks will be permitted as necessary to prevent cold stress

Activity	Potential Hazards		Recommended Controls
Mobilization/Demobilization	Back Injury from Materials Handling	•	Use proper lifting techniques
and Site Preparation (continued)		•	Loads greater than 50 pounds require assistance or mechanical equipment
		•	Prior to lifting, check the load for jagged or sharp edges
		•	Avoid torso twisting motions while handling or moving loads
	Inclement weather (Thunderstorms and tornadoes)	•	Halt activities immediately and take cover during thunderstorm or tornado warnings, shelter in a building if possible, stay away from windows
		•	If outdoors, stay close to the ground
		•	Listen to radio or television announcements for pending weather information
		•	Do not try to outrun a tornado on foot or in a vehicle
	Biological hazards (spiders, snakes, etc.)	•	Workers will inspect the work area carefully and avoid placing hands and feet into concealed areas
Surface Sweep	Unexploded Ordnance (UXO)	•	Prior to conducting a surface sweep of the work area the SSHS shall consult with the ROICC for specific UXO notification procedures
		•	Only certified UXO technicians may handle, analyze or move any suspected UXO material
		•	Conduct a surface sweep of the proposed work area using caution to visualize where you are stepping
		•	Follow the three "R's" for UXO:
			 Recognize it (it's potentially dangerous) Retreat form it (the same way that you entered the area) Report it (notify the ROICC or designated UXO support personnel)
		•	Remember, "If you did not drop it, do not pick it up"



Activity	Potential Hazards	Recommended Controls
Clearing and Grubbing	Chainsaw operations	Chainsaw shall not be fueled while running, hot, or near open flame
		Operator must utilize both hands on the saw controls during all cutting operations
		Operators must wear a minimum of safety glasses, hard hat and face shield, hearing protection, work gloves, safety shoes, and sawyer chaps
		Chainsaw shall not be used for cuts above chest high
}		Chainsaw engine idle shall be such that the chain is not engaged at idle
		Chainsaw shall be equipped with functioning automatic chain brake or kickback device
	Overhead hazard from felling of trees and limbs	Site workers must wear a minimum of safety glasses, hard hat and face shield, hearing protection, work gloves, and safety shoes
		Site workers shall maintain a safe distance from overhead work and the likely fall zone during cutting operations
		Site workers must request clearance to approach downed material from saw operator prior to moving or collecting material for disposal
	Contact with moving	Site workers shall utilize hand signals when verbal communication is not feasible
	equipment/vehicles	Any equipment operated on public roadways shall be equipped with functional head, tail, and signal lights
		Establish eye contact with operator before approaching any moving equipment
		Ensure heavy equipment is equipped with functioning backup alarms
	Faulty or damaged equipment	All machinery and equipment shall be inspected daily by a qualified operator prior to use
		Faulty or defective equipment shall be tagged and removed from service
		Use of a spotter while backing shall be required
	Noise	Hearing protection (ear muffs or plugs) will be worn with a noise reduction rating capable of maintaining personal exposure below 85 decibels "A-scale" (dBA)
		The SSHS will determine the need for hearing protection
		All equipment will be equipped with manufacturer's required mufflers

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Activity	Potential Hazards	Recommended Controls
Soil Excavation	Overhead/buried utilities	Area of excavation should be delineated and a utility locate performed prior to any excavation as applicable
		Overhead utilities should be considered live until determined otherwise
		Maintain a minimum distance of 15 feet from overhead utilities
		All underground utilities must be clearly marked before beginning work
	Heavy equipment operation	Maintain awareness of vehicle movement in work area and exercise caution when approaching heavy equipment
		Equipment will be equipped with functioning back-up alarms, signal lamps and alerting horns
		Operators are required to use seat belts
		Signs, barricades, flagmen, and/or other traffic control devices will be used to control traffic as necessary
		Buckets and attachments shall be placed on the ground if operator not at controls or if ground personnel approach
	Excavation Safety	Ensure equipment is placed so as to not contribute to a cave-in situation
		No personnel will be allowed to enter the excavation unless the excavation has been properly inspected, shoring and means of egress installed as necessary, all heavy equipment has been moved away from the affected edges, and any spoils have been removed from the edge
		Personnel shall not enter an excavation that exhibits the characteristics of a confined space
		Do not place spoil piles closer than 2 feet from the edge of the excavation
Installation, Filling, and	Back Injury from Materials	Use proper lifting techniques
Backfilling of the Geotextile Tubes and Scour Aprons		Loads greater than 50 pounds require assistance or mechanical equipment
Table and over riprone		Prior to lifting, check the load for jagged or sharp edges
		Avoid torso twisting motions while handling or moving loads



Activity	Potential Hazards	Recommended Controls
Installation, Filling, and Backfilling of the Geotextile	Heavy equipment operation	 Maintain awareness of vehicle movement in work area and exercise caution when approaching heavy equipment
Tubes and Scour Aprons (continued)		Equipment will be equipped with functioning back-up alarms, signal lamps and alerting horns
		Operators are required to use seat belts
		Signs, barricades, flagmen, and/or other traffic control devices will be used to control traffic as necessary
		Buckets and attachments shall be placed on the ground if operator not at controls or if ground personnel approach
	Geotextile tube fasteners	Any spikes or stakes used to hold the Geotextile tube in place shall be clearly marked so as to not present a trip hazard
	Dust from fill sand	To the extent feasible handle the fill sand in a moist condition to minimize dust generation
		Position body upwind if handling sand in a dry condition
	Sand slurry	Suction hoses shall be adequately guarded to prevent capture of body parts or clothing
		Taglines shall be affixed to suction hoses to facilitate control while maintaining a safe working distance
		Ensure fittings of slurry pump and hoses are secure
Safety Equipment Used	Inspection Requirements	Training Requirements
Level D PPE	Informal daily work area inspections	Site personnel have read and understand the Site Safety and Health Plan
First Aid Kit	to be conducted by the SSHS	Site personnel received site specific safety indoctrination for this project
Fire Extinguisher		SSHS will have CPR and First Aid training

Bhate Project Number: 9030080

AHA - 02

Task: Material Potentially Presenting and Explosive Hazard (MPPEH) Related Scrap Inspection, Certification and Disposal		Bhate Project Number: 9030080	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Location: Cheatham Annex, Yorktown, Virginia	
		Analysis Approved by: Judy McBride, CIH	Date: January 2006
Activity	Potential Hazards	Recommended Controls	
Inspection of Material and Containers	Potential MEC Unplanned Detonations Unauthorized Personnel Cuts and Lacerations.	 Observe all MEC safety precautions, and follow Only UXO qualified personnel will inspect scrap Be alert Mark and report any MEC encountered 	•
		 Place collection/work area downwind and away from break areas Follow safe work practices, and handle material as few times as possible Inspect containers for serviceability prior to placing any material inside 	
		 Ensure personnel have communications capabili Post barriers and barricades as necessary prior to Use and enforce the buddy system Ensure First Aid and Fire Extinguishers are in pl 	o commencing operations
		 No smoking, except in designated areas Cease operations if unsafe conditions arise Maintain positive site control; cease operations i Properly close and seal each container after inspections. Ensure safe placement of containers for shipmen Maintain accurate count of containers, weight, ar Complete, sign, and receive copy of Uniform Ha 	ection t nd fill



AHA – 02 (continued)

Task: Material Potentially Presenting and Explosive Hazard (MPPEH) Related Scrap Inspection, Certification and Disposal Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants,		Bhate Project Number: 9030080 Location: Cheatham Annex, Yorktown, Virginia	
Activity	Potential Hazards	Recommended Controls	
Consolidation, Packaging, and Loading Containers	 Potential MEC Unplanned Detonations Unauthorized Personnel 	 Observe all MEC safety precautions, and follow safe work practices Be alert, cease operations if unsafe conditions arise Identify safety/hazardous zones of operations Maintain positive site control; cease operations if unauthorized entry is made. Do not overload containers Use only authorized and approved containers Keep personnel to a minimum during operations 	
Completing Documentation	Unauthorized Personnel	 Do not allow unauthorized personnel into the area of operations Record all pertinent information on forms Ensure authorized signatures are documented on the DD Form 1348-1A Complete, sign, and receive copy of Uniform Hazardous Waste Manifest 	

AHA – 02 (continued)

Task: Material Potentially Presenting and Explosive Hazard (MPPEH) Related Scrap Inspection, Certification and Disposal Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Bhate Project Number: 9030080 Location: Cheatham Annex, Yorktown, Virginia	
		EQUIPMENT TO BE USED INSPECTION REQUIREMENTS	
	Inspection to be performed by Tech III or designated individual.	Training to be performed by UXOSO or designated individual.	
Hand Tools	Daily inspection of hand tools IAW the SSHP	Valid driver's license/operators permit/certification	
Communications Equipment	Daily communications checks	Knowledge of the Emergency Response and Notifications procedures IAW	
Fire Extinguishers	Daily checks of Fire Extinguishers	SSHP	
First Aid Kits	Daily checks of First Aid Kits and weekly inventory of kits Serviceability of containers Daily check for serviceability, fit, and comfort of PPE	Limitations and placement of extinguishers IAW the SSHP	
PPE		Techniques for the use of extinguishers IAW the SSHP	
		Size and type of extinguisher required by task IAW the SSHP	
		First Aid and CPR training as required by the SSHP	
		Universal safety precautions for blood borne pathogens IAW the SSHP	
		 Safe work practices and precautions associated with task being performed IAW SSHP 	
		Hand tool inspection	
		Specific MEC response training IAW the WP/SSHP	
		Personnel will meet requirements IAW the applicable regulations for the training and use of PPE	
		UXO identification and safety precautions for personnel IAW SHHP	
		Requirements under DOD 4160.21-M	
		Required documents for inspection, certification, and verification of MPPEH related scrap	



AHA – 03

Task: On-Site Vehicle Operation during Field Work		Bhate Project Number: 9030080	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Location: Cheatham Annex, Yorktown, Virginia	
		Analysis Approved by: Judy McBride, CIH Date: January 2006	
Activity	Potential Hazards	Recommended Controls	
Identify the hazards associated with vehicle operations	 Potential for vehicle accidents during field operations Proper use of vehicle for field operations 	 Always wear a seat belt Use a ground guide when reversing and/or as needed Obey the speed limit Obey all traffic signs Use the parking break if parked on inclines and/or as necessary Never leave the vehicle running unattended Daily vehicle inspections will be performed to insure a safe operating 	
		vehicle All drivers must have a valid driver's license Fire Extinguisher and First Aid Kit must be in the vehicle at all times	

AHA - 03 (continued)

Task: On-Site Vehicle Operation during Field Work		Bhate Project Number: 9030080	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Location: Cheatham Annex, Yorktown, Virginia	
		Analysis Approved by: Judy McBride, CIH	Date: January 2006
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS ed Training to be performed by UXOSO or designated individual.	
	Inspection to be performed by Tech III or designated individual.		
Vehicles	Daily Preventive Maintenance Checks and Service (PMCS)	Valid Drivers License Vehicle Familiarity	



AHA – 04

Task: MEC Investigation		Bhate Project Number: 9030080	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Location: Cheatham Annex, Yorktown, Virginia	
		Analysis Approved by: Judy McBride, CIH Date: January 2006	
Activity Potential Hazards		Recommended Controls	
Locate and Investigate Anomalies/Surface MEC	Potential MEC Unplanned Detonations Unauthorized Personnel Cuts and Lacerations	 Observe all MEC safety precautions, such as movement, heat, shock, and friction Only UXO trained personnel will locate and excavate anomalies Do not handle MEC items unnecessarily Establish Exclusion Zones based on the known hazards Establish and observe team separation distances Only UXO qualified personnel will handle MEC items if encountered Keep personnel to a minimum during operations Properly position personnel for observing spoils for MEC and establish safety arc prior to commencing operations Use and enforce the buddy system Ensure First Aid and Fire Extinguishers are in place No smoking, except in designated areas Be alert, cease operations if unsafe conditions arise Maintain positive site control; cease operations if unauthorized entry is made 	

Bhate Project Number: 9030080

AHA – 04 (continued)

Task: MEC Investigation		Bhate Project Number: 9030080	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Location: Cheatham Annex, Yorktown, Virginia	
		Analysis Approved by: Judy McBride, CIH	Date: January 2006
Activity	Potential Hazards	Recommended Controls	
Excavate/Investigate MEC.	 Potential MEC Unplanned Detonations Unauthorized Personnel 	Observe all MEC safety precautions such as movement, heat, shock and friction, and follow safe work practices Do not handle MEC items unnecessarily Only UXO trained personnel will excavate MEC Hand excavate when within 1 foot of the anomaly Do not dig directly over the item Be alert, cease operations if unsafe conditions arise Maintain positive site control; cease operations if unauthorized entimade Keep personnel to a minimum during operations Establish and observe team safe separation distances	
Identify and Record MEC	 Potential MEC Unplanned Detonations Unauthorized Personnel 	 Observe all MEC safety precautions such as movement, heat, shock, and friction, and follow safe work practices Maintain positive site control; cease operations if unauthorized entry is made Mark and report all MEC encountered Do not allow unauthorized personnel into the area of operations Maintain positive control and enforce safe separation distances Record all MEC encountered by size, type, condition, and location Identification of MEC items will be made by 2 UXO qualified personnel Do not handle MEC items unnecessarily 	



AHA – 04 (continued)

Task: MEC Investigation Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Bhate Project Number: 9030080 Location: Cheatham Annex, Yorktown, Virginia	
		EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS
	Inspection to be performed by Tech III or designated individual.	Training to be performed by UXOSO or designated individual.	
Magnetometer	Daily serviceability check of instrument	Instrument familiarity as required	
Communications Equipment	Daily communications check	Knowledge of the Emergency Response Notifications Procedures IAW	
MEC Flagging Material	Type and quantity of flagging material	the SSHP	
First Aid Kit	Daily checks of First Aid Kits and weekly inventory	Techniques for MEC avoidance	
PPE	of kits	First Aid and CPR training as required by the SSHP	
Hand Tools	Daily check for serviceability, fit, and comfort of PPE	Safe work practices and precautions associated with task being performed IAW the Work Plan	
		Specific response training IAW the WP and SSHP	
		Personnel will meet requirements IAW the applicable regulations for the training and use of PPE	
		Evacuation and emergency procedures IAW with the SSHP	
		UXO identification and safety precautions for UXO and Non-UXO personnel IAW the Work Plan or SSHP	
		OSHA qualifications and training as required IAW the Work Plan and SSHP	

Bhate Project Number: 9030080

AHA - 05

Task: Operating Heavy Equipment using Earth Moving Machinery (EMM)		Bhate Project Number: 9030080	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Location: Cheatham Annex, Yorktown, Virginia	
		Analysis Approved by: Judy McBride, CIH	Date: January 2006
Activity	Potential Hazards	Recommended Controls	
Placement and positioning of EMM for trenching and excavations	 Potential MEC Unplanned Detonations Unauthorized Personnel Cuts and Lacerations Fuel/oil spills 	 Observe all MEC safety precautions, and fol Only UXO qualified personnel will handle at encountered Be alert, mark and report any MEC encountered Only EMM qualified personnel will operate at Follow and complete all checklists that apply equipment, and task being performed Keep personnel to a minimum during operation Ensure personnel remain clear during placers Ensure spills containment materials for EMM Properly position EMM and establish safety apperations Post barriers and barricades as necessary prior operations Use and enforce the buddy system Ensure First Aid and Fire Extinguishers are in No smoking, except in designated areas Cease operations if unsafe conditions arise Maintain positive site control, cease operation made 	ny MEC items if ered equipment to the operation, ons eent of EMM If area available area prior to commencing or to commencing



AHA – 05 (continued)

Task: Operating Heavy Equipment using Earth Moving Machinery (EMM)		Bhate Project Number: 9030080	
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Location: Cheatham Annex, Yorktown, Virginia	
		Analysis Approved by: Judy McBride, CIH Date: January 2006	
Activity	Potential Hazards	Recommended Controls	
Trenching and Excavation of soil	n of Trench wall failure Unauthorized entry of personnel • Post signs and safety barriers/barricades as re 1926. Subpart P (i.e. Barricades, hand or med logs)		
		Observe all MEC safety precautions, and follow safe work practices	
		Be alert, cease operations if unsafe conditions arise	
		Identify safety/hazardous zones of operations	
		Use ground guide when necessary before moving/backing equipme and ensure backup signal is working	
		Ensure proper sloping of trench walls and placement of spoils IAW 29 CFR Part 1926. Subpart P	
		Ensure personnel remain at a safe distance from the trench opening	
	i	Maintain positive control, cease operations if unauthorized entry is made, and do not allow entry into the trench/excavation area without proper engineering controls and equipment, such as life lines if necessary	
		• Cease operations if unauthorized personnel enter the area	

Bhate Project Number: 9030080

AHA – 05 (continued)

Task: Operating Heavy Equipment using Earth Moving Machinery (EMM)		Bhate Project Number: 9030080
Minimum Personal Protective Equipment (PPE): Level D PPE (Long pants, shirts with minimum 4" sleeve, steel toe boots, safety glasses, hard hat for overhead hazards, leather work gloves, and hearing protection, as required)		Location: Cheatham Annex, Yorktown, Virginia
		Analysis Approved by: Judy McBride, CIH Date: January 2006
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
	Inspection to be performed by Tech III or designated individual.	Training to be performed by UXOSO or designated individual.
ЕММ	Daily PMCS for EMM	Valid Drivers License
Communications Equipment	Load limit verified on data plate	Vehicle familiarity
Fire Extinguishers	Daily communications checks	Equipment familiarity
First Aid Kits Spill Containers and Handling Equipment PPE	 Daily checks of fire extinguishers Daily communications check Daily checks of First Aid Kits and weekly inventory of kits Daily check for serviceability, fit, and comfort of PPE 	 Knowledge of the Emergency Response and Notification Procedures IAW the SSHP Limitations and placement of fire extinguishers IAW the SSHP Techniques for the use of the fire extinguishers IAW the SSHP Size and type of fire extinguisher required by task IAW the SSHP First Aid and CPR training/certification as required by the SSHP Universal safety precautions for blob borne pathogens IAW with the SSHP Safe work practices and precautions associated with the task being performed IAW the Work Plan or SSHP Equipment inspection, quantity, and type IAW the Work Plan and Spills SOP Specific response training IAW the Work Plan Evacuation and emergency response procedures IAW the SSHP UXO identification and safety precautions for UXO and Non-UXO
		personnel IAW the Work Plan and SSHP OSHA qualifications and training as required IAW the SSHP

APPENDIX E MEC DEMOLITION STANDARD OPERATING PROCEDURES

APPENDIX E

MEC DEMOLITION STANDARD OPERATING PROCEDURES

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1 PURPOSE

This standard operating procedure (SOP) will be used to assist Bhate and subcontractor UXO technicians in the safe and efficient handling and disposal of munitions and explosives of concern (MEC) found at CAX Site 7. The procedures contained within this SOP are to be considered general guidelines to aid in the performance of the tasks required to remove all MEC material and debris that could damage any geotextile tubes or geomembrane covering.

Experience and ongoing training programs have proven to be the best management tool for executing MEC disposal operations. Adherence to a rigid set of safety standards, policies, and procedures greatly enhance the overall success of the operation and ensures the safety of all personnel. It is the responsibility of all personnel regardless of position, to notify the Project Manager, Senior UXO Supervisor, or the UXO Safety Officer of any deviations or short cuts from existing safety precautions, warning, or safe operational practices.

2 BACKGROUND

Unexploded ordnance (UXO) is by its nature considered hazardous. For the remainder of this document UXO and MEC will be synonymous with one another. There is no "safe" procedure for handling and disposing of MEC, merely procedures that are considered to be the least dangerous. UXO technicians must be alert at all times and observe every safety precaution. Recovery of MEC is normally accomplished on active ranges, inactive ranges, and burial sites. The procedures and checklists contained in this SOP are general guidelines. The senior UXO technician has the authority to deviate as necessary, for any unusual circumstance, although no deviations are authorized that would otherwise be viewed as a shortcut to in-place safety requirements.

3 RESPONSIBILITES

3.1 Senior UXO Supervisor

The Senior UXO Supervisor is responsible for the overall performance of the operation. He will ensure that operations are carried out in a safe, efficient, and economical manner.

3.2 UXO Technician III

Disposal operations will be carried out under the direct supervision of a trained and experienced UXO Technician III who is responsible for all activities within the scope of disposal operations. The UXO Technician III will be on-site during all disposal operations and is responsible for ensuring that all personnel are familiar with their assigned functions and duties.

3.3 UXO Safety Officer

The UXO Safety Officer is responsible for ensuring that all elements of the disposal operation are conducted in a safe manner and that all safety regulations and procedures are being adhered to by the UXO technicians. The UXO Safety Officer will ensure that all personnel are trained in the use of their assigned equipment and are familiar with the materials being handled or disposed. The UXO Safety Officer will conduct periodic safety audits of the UXO technicians.

4 GENERAL SAFETY PRECAUTIONS

The Site Safety and Health Plan (SSHP) outlines safety considerations for the entire project. In addition to the SSHP the following will be observed during all demolition operations:

4.1 Basic Safety Precautions

- If an electrical storm is within 5 miles of the disposal operations, all disposal operations will cease immediately and all personnel will take protective cover.
- Observe all specific safety precautions applicable to the material being handled or disposed.
- Ensure that fire protection and first aid equipment are adequate, on-site, and available.
- Ensure that all tools and equipment are maintained in good working order.
- After handling explosives, ensure that all personnel wash their hands and faces before eating, drinking, or smoking.
- Ensure that housekeeping functions are maintained at workstations.
- There will be no smoking except in the area designated as the Smoking Area by the Senior UXO technician.

4.2 Vehicle Safety Precautions

- Vehicle operators will have, in their possession at all times, a valid driver's license for the class of vehicle they are operating.
- No more than two persons will be in a vehicle transporting explosive materials. No one is permitted to be in the bed of an open bed truck or trailer.
- Vehicles will not refuel while transporting explosives on site. Vehicles being refueled must be at least 100-feet from magazines or trailers containing explosives.
- Vehicles that have transported explosives will be cleaned of any explosive residue prior to being used on other tasks.

5 METEOROLOGICAL CONSIDERATONS

The following weather and meteorological limitations and constraints apply to the UXO work at the site.

- Demolition and disposal operations will not be conducted during electrical storms and will cease when electrical storms approach within 5 miles.
- Demolition and disposal operations will not be conducted during periods of reduced visibility. Full and unrestricted view of the disposal area is required. Operations will not be conducted during periods of rain, dense fog, blowing snow, sand, or dust storms.
- Demolition and disposal operations will not be conducted when winds exceed 20 miles per hour (MPH).
- Demolition and disposal operations will not be conducted during periods of heavy cloud cover. Heavy cloud cover is defined as overcast skies with more than 90% of the sky obscured by clouds or a ceiling of less than 1,000-feet. This will eliminate unnecessary shock waves.
- Demolition and disposal operations will not be conducted during periods of heavy weather inversion, i.e., smoke tends to remain on or near the ground.
- Demolition and disposal operations will not be conducted until at least 30 minutes after sunrise and will be completed at least 60 minutes prior to sunset.

6 TEAM BRIEFINGS

6.1 Disposal Team Leader Briefing

Prior to performing a demolition operation, the Senior UXO Technician will brief all personnel involved in the operation. Topics for the daily briefing will include, if appropriate, the following key points:

- Type of MEC being disposed.
- Type of counter charge that will be employed.
- Placement and quantity of counter charge.
- Method of initiation (electric, standard non-electric, or shock tube).
- Methods of transporting explosives.
- Route to the disposal site.
- Any engineering controls required to reduce fragmentation distances.
- Blasting equipment to be used for initiation.
- Control of blasting equipment.
- Misfire procedures.
- Post detonation cleanup.

6.2 Daily Safety Briefing

The UXO Safety Officer will conduct a daily safety briefing for all personnel involved in demolition and disposal operations. Topics for the daily safety briefing will include, if appropriate, the following key points:

- Care and handling of explosive materials.
- Personal hygiene.
- No running or horseplay on the range or disposal site.
- Remaining alert and diligent for explosive hazards.
- Location of emergency shelter (if available).
- Parking area for vehicles (vehicles must be positioned for immediate departure with engines running).
- Wind direction (toxic fumes if applicable).
- Location of first aid kits and fire extinguishers.

- Route to nearest hospital or emergency aid station.
- Communication in the event of an emergency.

6.3 Brief Personnel Assignments

The following specific tasks will be assigned to the UXO team and completed prior to disposal activities. These tasks may or may not have to be accomplished for a demolition shot. It is the responsibility of the Senior UXO Technician to ensure that all tasks are performed:

- Contact local police, fire department, and Federal Aviation Administration (FAA), as required.
- Contact hospital/emergency response personnel.
- Secure all access roads and paths to the disposal area.
- Visually check area for any unauthorized personnel to include the York River area.
- Designate a UXO Technician to maintain custody of blasting machine, fuse igniters, or shock tube initiators.

7 MEC HANDLING AND DISPOSAL PROCEDURES

7.1 Identification of MEC

Prior to any action being performed on an ordnance item, all fuzing will be positively identified. This identification will consist of fuze type by function, condition (armed or unarmed), and the physical state/condition of the fuze (i.e., burned, broken, parts exposed/sheared, etc). Each item will be determined acceptable or unacceptable to transport.

7.2 Disposal of MEC Safe to Move

Recovered military munitions or MEC will not be moved from the site until deemed acceptable to transport by both members of the UXO team. The UXO team, comprised of a UXO Technician III and a UXO Technician II, will inspect the condition of the MEC to be disposed. Once an item is identified as acceptable to transport, arrangements will be made with the local transportation vendor. The following information will be used to guide the transportation and disposal of MEC material to the Naval Weapons Station (NWS) Yorktown open burn/open detonation (OB/OD) Range.

- Contact Reactives Management, 1025 Executive Boulevard, Suite 101, Chesapeake, Virginia 23320, (757) 436-1033 and schedule transportation at the earliest possible time.
- While awaiting transportation of the MEC, build a sandbag barricade around the MEC material in accordance with (IAW) United States Army Corps of Engineer Report, August 1998, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions, which is located in Appendix J of the UXO Work Plan.
- The required permits to transport the MEC to NWS Yorktown OB/OD Range will be initiated and maintained by Reactives Management, who will provide a copy to Bhate for reporting and archive purposes. The following provides guidance for Bhate personnel to ensure Reactives Management is following proper procedures:
- A manifest will be submitted to the NWS Yorktown Environmental Group for signature prior to transportation of the item to NWS Yorktown.
- Proper Department of Transportation (DOT) training IAW Title 49 of the Code of Federal Regulations (CFR) Parts 105-199 (49 CFR Parts 105-199).
- Proper shipping papers IAW 49 CFR Parts 105-199.
- Vehicles used to transport MEC items meet all requirement listed IAW 49 CFR Parts 105-199.
- Use of the proper entrance gate and explosive route on NWS Yorktown.
- UXO teams will implement the Vehicle Transportation Checklist in Appendix A of the UXO Work Plan when transporting any MEC from CAX to the NWSY OD Range.

Whenever possible, detonations are to be initiated using either electric or shock tube demolition methods and techniques. These methods provide the maximum amount of control over the timing of the detonation and allow the detonation to be aborted up to the instant of initiation. Electrical Demolition Procedures can be found in Appendix F of the UXO Work Plan. Shock Tube Demolition Procedures can be found in Appendix G of the UXO Work Plan.

7.3 Disposal of MEC Unsafe to Move

If the MEC item is deemed unsafe to move, it will be blown-in-place. The design and implementation of engineering controls IAW United States Army Corps of Engineers Report, August 1998, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions, will be accomplished to mitigate the effects of a high-order detonation and can be found in Appendix J of the UXO Work Plan. Coordination with and approval of the Resident Office In-Charge of Construction (ROICC) point of contact, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Remedial Program Manager (RPM), NWSY Environmental Group, NWS Yorktown Safety Department, and CAX 7 Responsible Safety Officer is required before detonating MEC under such circumstances.

The UXO team, comprised of a UXO Technician III and a UXO Technician II, will inspect the condition of the MEC to be disposed. Whenever possible, detonations are to be initiated using either electric or shock tube demolition methods and techniques. These methods provide the maximum amount of control over the timing of the detonation and allow the detonation to be aborted up to the instant of initiation. Electrical demolition procedures can be found in Appendix F of the UXO Work Plan. Shock tube demolition procedures can be found in Appendix G of the UXO Work Plan.

8 ROADWAY CLOSURE

Roadways will be blocked when intrusive activities are conducted within the minimum separation distance (MSD). Road blocks will be coordinated with the government installation on-site representative during the initial coordination meeting or kick off meeting. At this time, during demolition procedures the maximum safe separation distance will close Chase Road south of storage building 12, Lynch Road west of storage building 13, and Chase Road east of building 261 and west of building 282. Once a sandbag barricade is in-place in accordance with Appendix J, the minimum separation distance can be reduced to that which is in Table 2-3 of the UXO Work Plan Addendum for Intentional Detonation with Engineering Controls.

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APPENDIX F

ELECTRIC DEMOLITION PROCEDURES AND PRECAUTIONS

APPENDIX F

ELECTRIC DEMOLITION PROCEDURES AND PRECAUTIONS

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1 SAFETY PRECAUTIONS

1.1 General

Always follow the unexploded ordnance (UXO) disposal procedures specified in Technical Manual/Explosive Ordnance Disposal (TM/EOD) 60A-1-1-31, *General Information on EOD Disposal Procedures*, and the specific procedures specified in TM/EOD 60 Series publication for the ordnance involved.

- The UXO Disposal Checklist, in Table 2-1 of this document, will be completed for each disposal operation. The completed checklists will be filed with the Field Activity Daily Logs.
- It is the responsibility of the Senior UXO Supervisor (SUXOS) to schedule the disposal operations. The SUXOS will ensure that all project personnel are accounted for before disposal operations begin.
- Always observe the safety precautions specified in TM/EOD 60A-1-1-22, General EOD Safety Precautions.
- Prevention of accidents in the transportation, storage, handling, and use of explosives depends on careful planning and the use of proper procedures.
- All explosive materials are dangerous and must be carefully transported, handled, stored, and used following proper safety procedures and under competent supervision.
- Always comply with Federal, state and local laws and regulations.
- Always review all electromagnetic radiation (EMR) hazards and safety precautions.
- Always review electrical grounding procedures prior to starting disposal operations.
- Always carry blasting caps in approved containers, keep them out of the direct rays of the sun, and 25 feet from other explosives until they are needed for priming.
- Never handle, use, or remain near explosives during the approach or progress of an electrical storm.
- Never use unexploded dud-fired ordnance items for demolition purposes.
- Never strike, tamper with, or attempt to remove or investigate the contents of a blasting cap (electric or non-electric), detonator, or other explosive initiating device. A detonation may occur.
- Never pull on the electrical lead wires of electric blasting caps, detonators, or other electroexplosive devices (EED). A detonation may occur.
- Never attempt to remove an unfired or misfired primer or blasting cap from a coupling base. There is a high risk of an explosion.

- Always point the explosive end of blasting caps, detonators, and explosive devices away from the body during handling. This will aid in reducing injuries should a detonation occur.
- The UXO team will prepare enough explosive charges to perform the planned destructions in a segregated area designated for this purpose.
- Initiators will always be transported in a separate container from the main-charge explosives.
- A minimum separation distance of 25 feet will be observed for initiators and main-charge explosives while at the disposal site.
- In accordance with the Explosive Safety Submission for this project the following fragmentation distances will be observed:
 - o Un-barricaded UXO: 1,346 feet
 - Sandbag Barricaded UXO: 219 feet
- Procedures outlined in the United States Army Corps of Engineers report, dated August 1998, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions will be adhered to at all times during demolition of UXO items on site, blow-in-place (BIP). Every UXO disposal will use these engineering controls.
- The UXO Disposal Team will lay out the firing wire.
- All detonations will be dual-primed. The firing wire and initiators will be tested for continuity and the SUXOS will observe the UXO Technician position the explosive charge against the UXO. Never bury the initiators (caps).
- The initiators will then be connected to the firing wire and secured to the end of the detonating cord or placed into the main charge.
- The SUXOS will then inspect the disposal shot and return to the safe firing point.
- Prior to initiation, the SUXOS will ensure that guards are stationed at the roadblocks, scan the hazard/fragmentation area with binoculars, and sound three distinct blasts on an air or vehicle horn. He will then scan the area again and initiate the demolition charge if all is clear.
- The UXO Disposal Team will conduct an inspection of the shot, after successful initiation of the explosive charge, to ensure complete destruction of the UXO.
- In the event of an electric misfire, a 30-minute wait time will be observed.

1.2 Electrical Priming Safety Precautions

- Always test the circuit for continuity and proper resistance using a blasting galvanometer or an instrument specifically designed for testing electric detonators and circuits containing them.
- Personnel working with electric blasting caps or other electro-explosive devices will not wear static producing clothing such as nylon, silk, or synthetic hair.

- The testing of electric blasting caps for continuity must be done at least 50 feet downwind from any explosives prior to connecting them to the firing circuit. Upon completion of testing, the lead wires will be short-circuited by twisting the bare ends of both wires together. The wires will remain shunted until ready to connect to the firing circuit.
- Electric blasting caps will be connected to the firing circuit before connection to the main initiation charge.
- Never hold the blasting cap directly in the hand when uncoiling the lead wires. Always hold the lead wires approximately 6-inches from the cap. This will minimize injury should the blasting cap explode. The lead wires of the blasting cap should always be straightened by hand and never thrown, waved, or snapped to loosen the coils.
- Always unroll the blasting cap leads so that the cap is as far as possible from the operator and pointing away from him. Always place the blasting cap in a hole or behind a barricade before removing the shunt and testing for continuity. Always make sure that the cap is not pointing toward other personnel or explosives.
- Always keep electric blasting cap wires disconnected from the power source and shunted until ready to test or fire. The individual removing the shunts should ground himself prior to this operation to prevent accumulated static electricity from firing the blasting cap.
- Always fire electric blasting caps with firing circuits in the range recommended by the manufacturer.
- Never connect blasting caps to the firing circuit unless the power end of the firing circuit is shunted.
- Always keep the firing circuit completely insulated from the ground or other conductors.
- Always be sure that wire ends are clean before connecting.
- Never use any instruments, such as electrician's meter, that are not specifically designed for testing blasting circuits or blasting caps. Such meters produce sufficient electrical energy to prematurely initiate electric blasting caps which can result in injury or death.
- Never mix electric blasting caps made by different manufacturers in the same circuit.
- Never mix electric blasting caps of different types in a circuit, even if made by the same manufacturer, unless such use is approved by the manufacturer.
- Never use aluminum wire in a blasting circuit.
- Never make the final hookup to the power source until all personnel are clear of the exclusion zone (EZ).

F -2-1

2 UXO DISPOSAL CHECKLIST

Review all Safety Precaution listed in paragraph 1 above.

Table 2-1. UXO Disposal Checklist

A.	Approval of disposal plan from SUXOS and NWS Yorktown Environmental Group and Safety Office Representative.	
B.	Ensure the site is secure. Appropriate EZ is established per the approved Explosive Safety Submission (ESS).	
C.	Ensure the blasting machine is in the control of the downrange team.	

SHORELINE STABILIZATION AT SITE 7

3 UXO ELECTRICAL PRIMING PROCEDURES

Review all Safety Precaution listed in paragraph 1 above.

Table 3-1. Electrical Priming Procedures

A.	Ensure the blasting machine is in the control of the downrange team.	
B.	Test the firing cable for continuity and short the wires or clips.	
C.	Barricade the electric blasting caps (EBCs).	
D.	Remove the shunt on an EBC.	
E.	Facing away from the barricade, test the continuity of the EBC with a galvanometer.	
F.	Replace the shunt or short the EBC.	
G.	Repeat steps A, B, C, D, E, and F for the second EBC.	
H.	Recheck the firing cable to ensure the cable is shorted.	
I.	Make a parallel circuit and connect the leg wires of the EBCs to the firing cable.	
J.	Connect the EBCs to the main charge. Return to the firing point.	
K.	Using binoculars ensure the area is clear and blow the air or vehicle horn three times.	
L.	Fire the charge.	
M.	Conduct a destruction site inspection.	

4 ELECTRICAL DEMOLITION MISFIRE PROCEDURES

Wait 30 minutes after an electric misfire before beginning an investigation.

Review all Safety Precautions listed in Section 1 of this procedure.

Table 4-1. Electric Misfire Procedures

A.	Repeat firing attempts.	
В.	Check firing circuit with galvanometer.	
C.	Switch blasting machines, if possible.	
D.	Repeat firing attempts.	
E.	Check circuit with galvanometer.	
F.	Short firing cable wires.	
G.	Wait 30 minutes before going down range.	
H.	Remove old blasting cap from charge and short wires after removing from firing circuit.	
I.	Using new Electric Blasting Caps, complete a continuity check on the blasting caps.	
J.	Reconnect blasting caps to firing circuit and re-prime the charge.	

APPENDIX G

SHOCK TUBE INITIATING SYSTEM PROCEDURES AND PRECAUTIONS

APPENDIX G

SHOCK TUBE INITIATING SYSTEM PROCEDURES AND PRECAUTIONS

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1 INTRODUCTION

In 1967, a system with "shock tube", a plastic tube with a very thin internal coating of aluminum and the High Molecular Weight rdX (HMX) explosive was introduced in Sweden by its inventor, Dr. Per Anders Persson. This system carried the trademark name of Nonel[®]. By the mid-1990s shock tube initiation had become the dominant non-electric initiation system used in the world.

Shock tube initiating systems utilize a dust explosion phenomenon in an almost empty plastic tube to transmit the initiation signal. The plastic shock tube is composed of one or more layers of plastic, which are designed to enhance the physical properties with the interior always composed of Surlyn[®]. The Surlyn serves to bind the thin interior coating of reactive dust (HMX and aluminum) to itself. The shock tube is very insensitive to initiation by ordinary heat or impact and requires an intense high impulse shock to be energized. The most commonly used initiation sources are various forms of mechanical devices that utilize a shot shell primer activated by a firing pin. Also used is a hand-held initiation device, which generates its energy by use of a piezoelectric crystal. Tight connections to appropriate strength detonating cords or initiators also serve as means of initiation. Shock tubing transmits the signal at approximately 6,500 to 7,000 feet per second (fps) (1,980 to 2,120 meters per second). Normally the tubing remains intact after activation, and except for the disappearance of the internal coating appears as it did prior to activation. Under certain circumstances, however, tubing may rupture and hot gases may erupt through the opening. For this reason it is never advisable to hold the tubing in the hand during initiation. A variety of shock tube system configurations are available for specific applications.

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2 SAFETY PRECAUTIONS

2.1 General

Always follow the unexploded ordnance (UXO) disposal procedures specified in Technical Manual/Explosive Ordnance Disposal Manuals (TM/EOD) 60A-1-1-31, *General Information on EOD Disposal Procedures*, and the specific procedures specified in TM/EOD 60 Series publication for the ordnance involved.

- The UXO Disposal Checklist in Section 3 and the Firing Procedures located in Section 4.1 below will be followed for each disposal operation. The completed checklists will be filed with the Daily Operations Summary located in Appendix A of the UXO Work Plan.
- It is the responsibility of the Senior UXO Supervisor (SUXOS) to schedule the disposal operations. The SUXOS will ensure that all project personnel are accounted for before disposal operations begin.
- Always observe the safety precautions specified in TM/EOD 60A-1-1-22, General EOD Safety Precautions.
- Prevention of accidents in the transportation, storage, handling, and use of explosives depends on careful planning and the use of proper procedures.
- All explosive materials are dangerous and must be carefully transported, handled, stored, and used following proper safety procedures and under competent supervision.
- Always comply with federal, state, and local laws and regulations.
- Never handle, use, or remain near explosives during the approach or progress of an electrical storm.
- Never use unexploded dud-fired ordnance items for demolition purposes.
- Never strike, tamper with, or attempt to remove or investigate the contents of a blasting cap (electric or non-electric), detonator, or other explosive initiating device. A detonation may occur.
- Never attempt to remove an unfired or misfired primer or blasting cap from a coupling base. There is a high risk of an explosion.
- Always point the explosive end of blasting caps, detonators, and explosive devices away from the body during handling. This will aid in reducing injuries should a detonation occur.
- Initiators will always be transported in a separate container from the main-charge explosives.
- A minimum separation distance of 25 feet will be observed for initiators and main-charge explosives while at the disposal site.
- In accordance with the Explosives Safety Submission for this project the following fragmentation distances will be observed:

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- o Un-barricaded UXO: 1,346 feet
- o Sandbag Barricaded UXO: 219 feet
- Procedures outlined in United States Army Corps of Engineer Report, August 1998, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions will be adhered to at all times when performing blow-in-place (BIP) activities on site. Every UXO disposal will incorporate these engineering controls to reduce damage from fragmentation.
- All detonations will be dual-primed. The firing wire and initiators will be tested for continuity and the SUXOS will observe the UXO Technician position the explosive charge against the UXO. Never bury the initiators (caps).
- Prior to initiation, the SUXOS will ensure that guards are stationed at the roadblocks, scan the hazard/fragmentation area with binoculars, and sound three distinct blasts on an air or vehicle horn. He will then scan the area again and initiate the demolition charge if all is clear.
- The UXO Disposal Team will conduct an inspection of the shot, after successful initiation of the explosive charge, to ensure complete destruction of the UXO.
- In the event of an electric misfire, a 30-minute wait time will be observed.

2.2 Safety Precautions When Using Shock Tube Systems

- Always ensure that shock tubing connections to detonating cord are at right angles to prevent angle cut-offs.
- Always avoid situations where initiation system components can become entangled in machines, equipment, vehicles, or moving parts thereof.
- Always lead shock tube to the hole in a straight line and keep it taut.
- Always follow the manufacturers' recommendations when cutting and splicing lead-in trunk line shock tube.
- Never drive any vehicles over shock tube.
- Never tie together two lengths of shock tubing. An initiation signal will not pass through a knotted connection.
- Never pull, stretch, kink, or put tension on a shock tube such that the tube could be caused to break or otherwise malfunction.

G-2-2

3 UXO DISPOSAL CHECKLIST

Review all Safety Precaution listed in paragraph 1 above.

Table 3-1 UXO Disposal Checklist

A.	Approval of disposal plan from SUXOS and NWS Yorktown Environmental Group and Safety Office Representative.	
В.	Ensure the site is secure. Appropriate (Exclusion Zone) EZ is established per the approved Explosive Safety Submission (ESS)	
C.	Ensure the blasting machine is in the control of the downrange team.	

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4 DETONATION PROCEDURES/SHOCK TUBE PRIMING (NONEL®)

Disposal activities are inherently hazardous and require strict adherence to approved safety and operational procedures. Violations of procedures may result in immediate removal from this project and/or termination of employment. During disposal operations, the SUXOS will ensure that:

- The area is clear and remains clear of personnel;
- Disposal shots are configured in a manner that precludes fragments from entering inhabited areas; and
- Positive control over the detonation is maintained.

Shock tube priming of explosives offers the instantaneous action of electric detonation without the risk of accidental initiation of the blasting cap (and the charge) by radio transmitters in the area, or by static electricity discharge. The explosion of the shock tube is totally contained within the plastic tubing, but the explosion of the aluminum tube is just like any other similar strength blasting cap.

4.1 Firing Procedure

• Place and secure demolition charges/devices on targets.

Warning: Do not place caps in charges until instructed to do so in the procedure below.

- Lay out the shock tube, with caps attached, from near (one to two feet) charges to initiating point.
- After the shock tube(s) have been laid out all the way to the site from where the detonation is to be initiated, the designated operator must maintain absolute control of the initiating element. Assure all personnel are moved to a safe distance from the charge(s) at this time.
- The designated operator may now proceed back to the demolition charge(s) and install the cap(s) in the charge(s).
- The designated operator will return to the site from which the charge(s) will be initiated and, when it is near time to initiate the shot, will secure the initiating element to the shock tube.
- Cut off the crimped/sealed end of the shock tube and push it into the hole in the igniter's end cap as far as it will go. Twist the shock tube a little to assure it goes into the smaller of the igniter's internal clutching devices. Once the shock tube has seated, hold the igniter securely and pull lightly on the shock tube to assure the shock tube is secure.
- Assure that all personnel are at a safe distance or under cover appropriate to their distance from the explosives.

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- Grasp the igniter body firmly, with the pull ring firmly accessible to your other hand.
- To fire the charge(s), sharply pull the igniter's pull ring to actuate the igniter. The pop of the igniter's primer should be heard, followed by the explosive detonation of the main demolition charge.

4.2 Splicing Shock Tube

The high reliability of shock tube blasting caps is the fact that all of the components are sealed and, unlike standard non-electric priming components, cannot be easily degraded by moisture. Cutting the shock tube makes the open end vulnerable to moisture. Care will be taken to keep moisture from the cut end of the shock tube.

4.2.1 General: Safety Precautions

- When cutting a piece of shock tube, immediately tie a tight overhand knot in both cut ends (unless it will be spliced immediately).
- Always use a sharp knife or razor blade to cut the shock tube so the opening in the tubing will be unobstructed.
- Always cut shock tube squarely across and make sure the cut is clean.
- Use only the splicing tubes provided to make splices. Taping two cut ends of shock tube together does not make a reliable splice.
- Every splice in shock tube reduces the reliability of the priming system. Keep the number of splices in a shock tube line to as few as practicable.

4.2.2 Proper Splicing Procedure for Shock Tube

- Use a sharp knife or razor blade to cut approximately 18 inches from the previously cut off end of left over shock tube, whether or not it was knotted in accordance with the above guidance. Dispose of the 18-inch piece of shock tube in accordance with local regulations on such flammable items.
- Cut off the free, sealed shock tube end of the cap to be extended with a sharp knife or razor blade.
- Loosely tie the two shock tube ends to be spliced together in a square knot. Leave at least a two-inch free end of each shock tube beyond the knot. Push the shock tube lightly to tighten the knot, but not so tight as to significantly deform the shock tube in the knot.
- Push one of the free shock tube ends to be spliced firmly into one of the pre-cut splicing tubes at least 1/4 inch. Push the other shock tube end firmly into the other end of the splicing tube at least 1/4 inch.
- Spool out the desired length of shock tube and cut it off with a sharp knife or razor blade.

- Immediately seal off the shock tube remaining on the spool by tying a tight overhand knot in the cut off end.
- Attach an initiator to the cut end of the shock tube spliced to the blasting cap in accordance with standard operating procedures or tie a tight overhand knot in this end if it is to be actuated by another blasting cap or detonating cord.

5 MISFIRES

The following steps should be performed in the event of a misfire prior to investigating the downrange setup:

A minimum of 30 minutes will elapse before from the time of last attempted initiation before proceeding downrange to investigate the probable misfire.

The most common cause of a misfire in a shock tube priming system is the initiating element. The most common failure with this system is the primer not firing. The corrective action is to recock the igniter by pushing in on the pull rod to re-engage the firing pin and then actuate the igniter again.

5.1 Misfire with Shock Tube

A minimum of 30 minutes will elapse before from the time of last attempted initiation before proceeding downrange to investigate the probable misfire.

- 1. If two or three retries with the igniter do not result in a successful firing, cut the shock tube at least 6 inches from the end, install a new igniter, and repeat firing procedure.
- 2. Another misfire mode with the igniter is that the primer fires, but blows the shock tube out of its securing mechanism without firing it. The corrective action is to cut approximately six inches from the end of the shock tube, replace the igniter, and repeat firing procedure.
- 3. If the igniter appears to have functioned properly (primer pops and smokes), but the charge did not fire, cut a one-foot section from the shock tube starting approximately six inches from the igniter. Hold the one foot piece of shock tube so that one end is over the palm of your hand and gently blow through the other end. If a fine powder is blown from the shock tube, it has not fired. If this is the case, install a new igniter on the freshly cut end of the priming shock tube.
- 4. If the igniter/initiating element functioned properly and no fine powder was blown from the shock tube in the previous step, or the shock tube was heard to fire or its flash was seen, observe the standard half hour waiting time before going downrange to check the next element(s) in the priming train. Shock tube blasting caps are non-electric blasting caps and the standard rules apply in the event of a misfire.

A minimum of 30 minutes will elapse before from the time of last attempted initiation before proceeding downrange to investigate the probable misfire.

5. After the half hour waiting time has passed, precede downrange and check the detonator of the first component in the priming train. If the detonator has not fired, attach an identical component to the shock tube (or detonating cord) of the uninitiated second component close to the unfired detonator of the failed component. Lay out the shock

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- tube of the replacement component back to the site from which the shot is to be initiated and repeat the standard initiator attachment and fire when it is safe to do so.
- 6. After the charge has been fired, deal with the unfired relay cap and its attached (partially fired) shock tube in accordance with standard procedures for disposing of an unfired blasting cap.
- 7. If the first compartment of the firing train was not the one which failed, check out each succeeding component until the failed one is found and replace the failed or fired relay components back to the initiating site as in step 5. To determine if the shock tube has fired at a particular point, step 3 may be done with a one-foot section of shock tube cut from the suspect area.
- 8. If the failed component appears to be the final blasting cap, it may be replaced as above if it is above the ground and easily accessible. If it is below ground or placed in a plastic explosive charge, it must not be disturbed. At this point, use the procedures for electric firing systems.
- 9. Never yank or pull hard on the shock tube because it may actuate the detonator.

5.2 Misfires with Shock Tube Initiation Systems

In most misfires of the shock-tube blasting caps, which are non-electric, apply the standard rules.

A minimum of 30 minutes will elapse before from the time of last attempted initiation before proceeding downrange to investigate the probable misfire.

- 1. If the primer does not fire (the most common problem), attempt to re-actuate the igniter again. If two or three retries result in a non-firing, cut the shock tube, replace the igniter with a new one, and repeat the firing procedure.
- 2. If the primer fires and blows the shock tube out of its securing mechanism without it firing, cut about 3 feet from the end of the shock tube, replace with a new igniter, and repeat the firing procedure.
- 3. If the primer appears to have functioned properly but the charge did not fire, cut a 1-foot section from the shock tube starting 6 inches from the igniter. Hold the 1-foot piece of shock tube so one end is over your palm; gently blow through the other end. If a fine powder comes out from the shock tube, it has not fired. Install a new igniter on the freshly cut end of the priming shock tube and repeat the firing procedure. If no fine powder comes out from the shock tube or the shock tube was heard to fire or its flash was seen, wait for 30 minutes before moving downrange to check the components in the firing system.

A minimum of 30 minutes will elapse before from the time of last attempted initiation before proceeding downrange to investigate the probable misfire.

- 4. If the first component of the firing train did not fail, check out each succeeding component until you find the one that failed. Replace the failed or fired relay components back to the initiating site and re-fire.
- 5. If the final high-strength blasting cap seems to be the failed component, replace it if it is easily accessible. However, if it is used to prime an explosive charge, do not disturb it. Place a new, primed explosive charge next to the misfired charge and detonate it when it is safe.

APPENDIX H MSD CALCULATION SHEETS

Minimum Separation Distance Calculations

Cheatham Annex Site 7N

3-inch Stokes Mortar

15 April 2005

PREPARED BY: Tim King

This form shows calculated distances only. It does not constitute approval. Concurrence of Naval Ordnance Safety and Security Activity is required to determine applicable distance for a specific site.

In accordance with the Department of Defense Explosive Safety Board (DDESB) Technical Paper 16, *Methodologies for Calculating Primary Fragment Characteristics*, dated 1 December 2004, the minimum separation distance for unintentional detonations shall be the largest of the maximum fragment range, the K-Factor 50 (K50) (50*W^{1/3} where W is the total net explosive weight for the detonation) overpressure or 200 feet. In accordance with Ordnance Pamphlet 5, use of the range to no more than 1 hazardous fragment/600 square feet as the minimum may be used as the exclusion zone. The embankment provides a natural barricade to the base populace and surrounding buildings in the event of an unintentional detonation while excavating by hand or with the large backhoe. When intentional detonations occur, such as a blow-in-place operation, the maximum fragment range will be used as the exclusion zone.

CALCULATED FRAGMENT DISTANCES

Maximum Fragment Range = 1,346 feet

Range to No More Than 1 Hazardous Fragment/600 sq ft = 219 feet

CALCULATED OVERPRESSURE DISTANCES BASED ON OE ITEM'S EXPLOSIVE WEIGHT ONLY (i.e. NO DONOR CHARGE)

Range to 0.9 pounds per square inch pounds per square inch (psi) Overpressure (K50) = $\underline{68}$ feet

K328 Overpressure Range = $\underline{446}$ ft (based on munition NEW only, no donor charge)

The primary fragmentation characteristics used in the calculation of the values listed above were computed in accordance with DDESB Technical Paper 16. The range to no more than 1 hazardous fragment/600 square feet was calculated in accordance with DDESB Technical Paper 16.

Minimum Separation Distance Calculations

Cheatham Annex Site 7N

3-inch Stokes Mortar

15 April 2005

SANDBAG ENCLOSURE FOR INTENTIONAL DETONATIONS

Required Sandbag Thickness = $\underline{24}$ inches with 6 feet standoff between munition and sandbags

Sandbag Throw Distance = 125 feet

Minimum Separation Distance = 200 feet

The required sandbag thickness and the sandbag throw distance were calculated using CEHNC-ED-CS-S-98-7. A copy of CEHNC-ED-CS-S-98-7, "Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions" must be available on site.

Minimum Separation Distance Calculations

Cheatham Annex Site 7N

3-inch Stokes Mortar

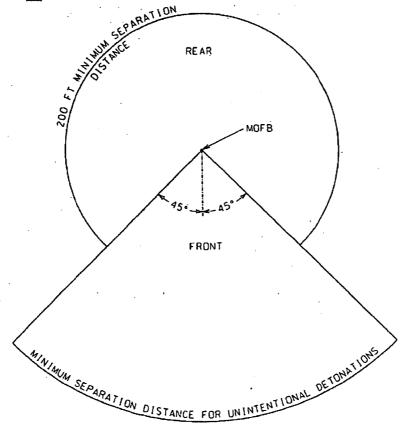
15 April 2005

Miniature Open Front Barricade (MOFB) must be maintained based on the expected throw distance of the MOFB itself.

Minimum Separation Distance to sides and rear = $\underline{200}$ feet

Minimum Separation Distance to front (Using 1/600) = 219 feet

K50 Distance = 68 feet



MINIMUM SEPARATION DISTANCE FOR UNINTENTIONAL DETONATIONS
USING MINIATURE OPEN FRONT BARRICADE DURING INTRUSIVE ACTIVITIES

regory:	HE Rounds	DODIC:	
nition:	3" Stokes	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
mary Database Category:	mortar	Individual Last Updated Record:	Crull
condary Database Category:	3 in	Date Record Retired:	
tiary Database Category:	TNT		
Munition Inform	MANUAL PROPERTY AND ADDRESS OF THE PARTY OF	Theoretical Calculated Fra	gment Range
Fragmentation Ch	aracteristics	Range to No More Than	
Explosive Type:	TNT	1 Hazardous Fragment/600 Square FeetA (ft):	19
Explosive Weight (lb):	2.10000		13
Diameter (in):	3.0000	Vertical Range of Maximum Weight Fragment (ft):	1071
Max Fragment Weight (lb):	0.043600		10.1
Critical Fragment Velocity (fps)	: 6189	Maximum Weight	1346
		Fragment (ft):	1340
Overpressure	e Distances	Minimum Thickness to Pro	event Perforation
		4000 psi Concrete	2 72
Inhabited Building Distance (12 psi), K40 Distance:		(Prevent Spall):	3.73
		Mild Steel:	0.68
Inhabited Building Distance (09 psi), K50 Distance:		Hard Steel:	0.56
		Aluminum;	4.38
Intentional MSD (0065 psi), K328 Distance:		446 LEXAN:	2.87
		Plexi-glass: Bullet Resist Glass:	2.87
		Bullet Resist Glass:	2.26
Required Sandbag 1	Thickness	Water Containment Syste	
Max Fragment		Separation Dis	tance:
Weight (lb)SB:	0.043600	Max Fragment Weight	
Critical Fragment Velocity (fps)SB:	6189		0.043600
Kinetic Energy 106		Critical Fragment Velocity (fps)W:	6189
(lb-ft2/s2)SB:	0.8350	Kinetic Energy 106	
Required Wall _Roof Sandbag Thickness (in)SB:	24	/lb-ft2/c2\W:	0.8350
Expected Maximum		Water Containment 110	0 gal tank
Sandbag Throw Distance		System:	
	125	Minimum Separation	200
(ft)SB:		Distance (ft)W:	200

APPENDIX I RESUMES

UNITED STATES ARMY CORPS OF ENGINEERS UXO RESUME

TIMMY F. KING

DATE ATTENDED BASIC EOD SCHOOL: APRIL – SEPTEMBER 1982

OTHER PERTINIENT TRAINING: HAZWOPER 40 HOUR, MARCH 2000; 8-HOUR HAZWOPER REFRESHER, SEPTEMBER 2004; HAZMAT/OSHA SUPERVISOR COURSE, OCTOBER 2004; CPR, MARCH 2005; FIRST AID, SEPTEMBER 2003; RISK MANAGEMENT COURSE, AUGUST 2003, HAZARDOUS MATERIALS AWARENESS, DOD FIREFIGHTER CERTIFICATION, MARCH 2004, OPERATIONAL RISK MANAGEMENT FUNDAMENTALS, MAY 2003; OPERATIONAL RISK MANAGEMENT ESSENTIALS FOR LEADERS, MAY 2003

MILITARY EOD ASSIGNMENTS:

- 1999 2004 UXO Supervisor, Multiple projects, Eglin Air Force Base, Eglin AFB, (Ft. Walton Beach, FL), Risk Management Board Member, UXO Supervisor, 96th Civil Engineer Squadron EOD Flight Managed a 50-person UXO detachment, Active Live and Practice Target Range Clearance Data Analysis, OE/UXO Clearance Operations, OE/UXO Thermal Treatment Facility Integration, Large Range Working Group Committee Member, OE/UXO Disposal Treatment Facility Manager, Range Clearance Operations, Explosive Operations
- 1998 1999 Director UXO Operations, 8th Civil Engineer Squadron EOD Flight, South Korea, had in-depth knowledge of explosive storage requirement, transportation, and movement requirements
- 1993 1999 EOD Instructor, Naval EOD School, Eglin AFB, Florida, Master OE/UXO Training Instructor, Demolitions, Chemical Materials, and Basic Ordnance Physics
- 1987 1999 UXO Technician, 2nd Civil Engineer Squadron EOD Flight, Barksdale AFB, Louisiana, OE/UXO Master Technician, Quality Assurance Evaluator, Base Realignment and Closure, OE/UXO Clearance Operations
- 1984 1987 UXO Technician, 52nd Bomb Wing 7007th EOD Flight, Germany, International EOD Associations, OE/UXO Disposal Operations
- 1982 1984 UXO Apprentice, 1606 ABW EOD Flight, Albuquerque, New Mexico, OE/UXO Apprentice, OE/UXO Range Clearance Operations, Munitions Disposal Operator
- Sep 1982 Basic Explosive Ordnance Disposal
- May 1982 Air Force Basic Training

CIVILIAN UXO EXPERIENCE

Sept 2005

UXO Avoidance Services for Arcadis during installation of temporary well installation on Barefoot Range, Myrtle Beach, South Carolina.

March 2005

Present

UXOSO Holloman AFB, New Mexico for DP-63 UXO Remediation. Assisted in the development of Explosive Safety Submission and UXO Work Plan. UXOSO during the excavation of three discarded military munitions disposal pits containing asbestos materials. Developed and implemented procedures to clean up the remaining pits while adhering to Federal Regulations for asbestos cleanup/removal.

March 2005

Present

Department of the Navy, NAVFAC Mid-Atlantic Division. Developed and authored the Explosive Safety Submission and UXO Work Plan for the Time Critical Remediation Action of MEC Removal from the shoreline of the York River.

Aug 2004

-Present

OE/UXO Director for Bhate Environmental Associates, Inc., Birmingham, AL.

April 2005

UXO Abbreviated Site Safety and Health Plan for Camp Van Dorn FUD Site in Mississippi. Bhate authored an abbreviated site safety and health plan for a limited site visit at Camp Van Dorn, a formerly utilized defense site (FUDS).

Nov 15 2004

SUXOS for OE/UXO Construction and Demolition services for Bhate Environmental Associates, Inc. at the Mississippi Ordnance Plant. Authored the avoidance work plan and accident prevention plan. Tim also conducted all on-site operations for the avoidance of MEC during the demolition of two WWII powder assembly lines for the USACE Mobile District.

1988 - 1992

Performed explosive operation services to the Confederate Air Force Air Show Power Demonstrations, Longview, Texas. Assisted in the set-up of multiple explosive setups for the air show. The setups used DuPont blasting caps with ammonium nitrate as the main booster.



Tim King
OE/UXO Director

STATE OF THE PARTY	
	MBA
	BS, Accounting
	Master Explosive Ordnance Disposal Craftsman Certificate
	CPR Certified - March 2005
Education	40-Hour Hazwoper – March 2000
	8-Hour Refresher – Sept 2004
	HAZMAT OSHA Supervisor – October 2004
	DOT Hazardous Transportation – November 2003
	First Aid – September 2003

Tim has over 22 years of diverse experience in the Explosive Ordnance Disposal (EOD) career field with the United States Air Force. Tim has recently joined Bhate Associates as our OE/UXO Director. Prior to joining Bhate, Tim managed the Test Directives and Robotics Division of the 96th Civil Engineer EOD Flight at Eglin Air Force Base, Florida. Tim managed over 100 explosive operations and assured the safety of all on-site personnel with no "Lost Time Accidents". Tim is currently the OE Project Manager for two large remediation projects for the Omaha Corps of Engineers and the Navy. He is responsible for all administrative, financial, and technical components of the division's projects including proposal/estimate preparation, contract negotiations, resource identification and allocation, execution, safety, quality control, cost control and financial reporting, project historical reporting, and customer satisfaction.

SITE 7 OE REMEDIATION FOR NAVAL WEAPONS STATION YORKTOWN, CHEATHAM ANNEX and NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC.

Bhate is the prime for removal of all munitions and explosives of concern from an area on Naval Weapons Station Yorktown, Cheatham Annex, located in Williamsburg, Virginia for the United States Navy. Bhate is fully responsible for the compliance with United States Army Corps of Engineers (USACE), Department of Navy Naval Ordnance Safety and Security Activity (NOSSA), Department of Defense (DOD), and the Virginia Department of Environmental Quality (VDEQ) requirements regarding personnel safety, equipment, technical procedures, and environmental compliance. This project is a Time Critical Remediation Action and is a combined effort to construct geotextiles tubes that will reduce erosion on the rivers embankment. Bhate completed a site visit and assessment of the Time Critical Remediation efforts for Site 7, completed the Explosive Safety Submission and submitted to the Naval Facilities Engineering Command Mid-Atlantic for approval, and completed all Ordnance and Explosives (OE) Work Plans and required addendums. The project includes surface clearance of all OE material prior to the removal of shrubs and trees, clearance of the area where a silt fence will be installed, and the removal of all debris and MEC material using a Mag and Dig approach of a 300' long by 25' wide area.

All supporting data will be collected, maintained, and submitted in monthly reports to the appropriate naval facilities. Excavation of the remaining site will be performed using a large backhoe and sifting all the material on a belt fed shaker using a 2 inch screen. The total area of excavation is 300' long by 150' feet wide and excavated to a depth of 4 feet. All operations are in compliance with DOD, Navy and U.S. Army Corps of Engineer directives, regulations, pamphlets, and local guidance. The disposal of munitions will be conducted by Bhate either on-site or at the Open Detonation Range of Naval Weapons Station Yorktown Explosive Ordnance Disposal Range.

ORDNANCE AND DISPOSAL PITS SITE 63 REMEDIAL ACTION OPERATIONS FOR THE OMAHA CORPS OF ENGINEERS DISTRICT

Tim is the OE/UXO Project Manager for the Remedial Action Operations (RAC) for three OE contaminated sites on Holloman Air Force Base, New Mexico, known as DP-63. Bhate is fully responsible for the compliance with United States Army Corps of Engineers (USACE), Department of Army (DA), Department of Defense (DOD), and the New Mexico Environment Department (NMED) requirements regarding personnel, equipment, and procedures. (All UXO operations shall be performed in a manner consistent with the Resource Conservation Recovery Act (RCRA) and the National Contingency Plan [NCP]). This effort involved the subsurface clearance of potential unexploded ordnance (UXO), Discarded Military Munitions (DMM) and Munitions and Explosives of Concern (MEC). The RAC performance requirements included preparing and submitting the Explosive Safety Submission, UXO Work Plan, Site Specific Safety and Health Plan, weekly and monthly reports, and all supporting documentation to the Corps of Engineers. Performance of Ordnance and Explosives (OE) site characterization and removal assessment, OE sifting operations of two disposal pits and one detonation site, certification of all scrap material to be transferred to the Defense Reutilization Management Office (DRMO), and treatment of all contaminated soil using approved technology. The goal of the RAC was to attain No Further Action Required from the NMED.

UXO ABBREVIATED SITE SAFETY AND HEALTH PLAN FOR CAMP VAN DORN FUD SITE IN MISSISSIPPI.

Bhate authored an abbreviated site safety and health plan for a limited site visit at Camp Van Dorn, a formerly utilized defense site (FUDS).

UXO AVOIDANCE DEMOLITION SUPPORT, MISSISSIPPI ORDNANCE PLANT DEMOLITION PROJECT, MOBILE CORPS OF ENGINEERS

Bhate provided OE/UXO demolition avoidance support during the demolition of two World War II ordnance assembly lines that were abandoned in the late 1940s. These sites were FUDS. Bhate provided UXO safety oversight and authored and implemented all Site Specific Safety and Health Plans associated with sites contaminated with OE/UXO material.

UXO SUPERVISOR, 96TH CIVIL ENGINEER SQUADRON EOD FLIGHT, EGLIN AFB, FL.

Managed and supervised a 50-person UXO detachment. This organization is responsible for emergency response to accidents/incidents involving OE/UXO, providing escort to project personnel and contractors on Eglin AFB ranges, supporting the 46th Test Wing weapons design process and evaluating weapons inventory.

RISK MANAGEMENT BOARD MEMBER, EGLIN AFB, FL.

Tim was a member of over 25 risk management boards, designed to review all functional aspects of a weapons testing project. The board provided solutions to issues concerning safety, recovery, and development of critical EOD procedures. These meetings facilitated by the project officer and customer have received accolades from the test community for our dedication to customer satisfaction while keeping safety the top-most priority.

OE/UXO CLEARANCE OPERATIONS, EGLIN AFB, FL.

Tim directed live target clearance operations, safety escort of project personnel, and inspections of scrap metal for hazardous materials on 16 ranges and test sites spanning over 463,000 acres on Eglin AFB. He was directly responsible for ensuring the timely clearance of these heavily used target ranges without disrupting the current operations tempo of two major Air Force installations and other military entities utilizing these ranges. He incorporated risk assessment and management with the daily operations associated with clearance, completing all clearances on time with zero accidents.

OE/UXO THERMAL TREATMENT FACILITY INTEGRATION, EGLIN AFB, FL.

Tim was solely responsible for the implementation of a one-of-a-kind Transportable Burn Kettle Processor (TBKP) for Eglin AFB Test Wing. This \$450,000 unit was shipped to his treatment facility with no lesson plan, operating instructions, and environmental regulation authorization for its use on Eglin's two disposal sites. Tim directed the initial curing process of the TBKP, managed the construction of ramps and walls for personnel safety during operations, developed the operating instructions, conducted certification training for his 55 person EOD Flight and assisted in approval from the Florida Department of Environmental Protection (FDEP). The unit operated under Eglin AFB's current OB/OD State FDEP Permit and continues to provide clean, nondestructive disposal of waste munitions that do not have fragmentation producing characteristics.

EXPLOSIVE CHARACTERISTICS AND ANALYSIS, EGLIN AFB, FL.

Tim developed EOD procedures for the USACE - Waterways Experiment Station project concerned with developing barriers capable of withstanding the detonation of large quantities of explosives. His explosive techniques assured project personnel and engineers retrieved invaluable test information required for future improvements and design modifications of existing barriers used throughout the United States and overseas.

OPEN BURN/OPEN DETONATION SITES, EGLIN AFB, FL.

Tim managed the Open Burn/Open Detonation sites for Eglin AFB under FDEP Permit regulations. He directed the operational use of the detonation and burn sites, assuring all environmental requirements were met or exceeded. His responsibilities included monthly reporting to the Environmental Management Office, conducting annual training to all of the waste treatment employees, documentation of operation historical data to include processing required reports and documentation archiving, and conducting inspections and investigations of the disposal site and equipment.

MASTER OE/UXO TRAINING INSTRUCTOR, EGLIN AFB, FL.

Tim was assigned to the Naval Explosive Ordnance Disposal School as an instructor for three divisions; Core Instruction (Phase I), Chemical Identification and Remediation (Phase I), and the Demolition Division (Phase I). He was a subject matter expert (SME) in each of these divisions and taught over 775 international and US students. Tim was awarded "Instructor of the Year for 1996".

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June 2006

APPENDIX J

USACE USE OF SANDBAGS FOR MITIGATION OF FRAGMENTATION AND BLAST EFFECTS DUE TO INTENTIONAL DETONATION OF MUNITIONS



Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions

HNC-ED-CS-S-98-7 AUGUST 1998



DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD 2461 EISENHOWER AVENUE ALEXANDRIA, VIRGINIA 22331-0600

DDESB-KO

23 February 1999

MEMORANDUM FOR DIRECTOR US ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY (ATTENTION: SIOAC-ES)

SUBJECT: Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonations of Munitions, Report HNC-ED-CS-S-98-7 (August 1998)

References: (a) SIOAC-ESL memorandum, dated 30 Nov 98, same subject

(b) Joseph M. Serena and Michelle Crull, "Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonations of Munitions, Report HNC-ED-CS-S-98-7," (August 1998)

The subject site plan forwarded by reference (a) has been reviewed with respect to explosives safety criteria. The site plan addresses the use of sandbags, IAW reference (b) to mitigate hazards and protect personnel from intentional detonations of munitions up to the 155-mm M107. Based on the information furnished, the proposed use of sandbags for intentional detonations at ordnance and explosives (OE) sites, IAW reference (b) is approved.

A copy of this site plan package and this letter of approval must be available at OE sites where intentional detonations are conducted that use procedures of this siting package.

Point of contact is Dr. Chester E. Canada, DDESB-KT2 (PH: commercial: 703-325-1369, FAX: 703-325-6227, E-MAIL: canadce@hqda.army.mil).

DANIEL T. TOMPKINS

Colonel, USAF Chairman

cc:

Army Safety Office, ATTN: DACS-SF, Chief of Staff, 200 Army Pentagon, Washington, DC 20310-0200

Commander, U.S. Army Corps of Engineers, ATTN: CESO, 20 Massachusetts Avenue NW, Washington DC 20314-1000

Commander, U.S. Army Engineering and Support Center Huntsville, ATTN: CEHNC-ED-CS and CEHNC-OE-CX-Q, P.O. Box 1600, Huntsville, AL 35807-4301

Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions

Prepared by Joseph M. Serena, III, PE Michelle Crull, PhD, PE

August 1998

Department of the Army
Huntsville Center, Corps of Engineers
Attn: CEHNC-ED-CS-S
P.O. Box 1600
Huntsville, AL 35807-4301
Telephone: Commercial 256-895-1650

Reviewed by: Asland 8/13/98
WALLACE WATANABE
Chief, Structural Branch

Date

Reviewed by:

| PAUL M. LAHOUD, PE | Date

Chief, Civil-Structures Division

EXECUTIVE SUMMARY

The U.S. Army Engineering and Support Center, Huntsville (USAESCH) is currently engaged in projects which require the disposal of uncovered/discarded ordnance and explosives (OE) on public and private lands. The uncovered OE item is often detonated in place if it is too dangerous to move. In some cases, covering and tamping with loose earth is used to contain the blast and fragments. Another method to mitigate the fragmentation and blast effects is to cover the item with sandbags. However, traditionally there has been no method to determine the optimum configuration or the required thickness of such a sandbag enclosure.

The Structural Branch, USAESCH, sponsored a test program in 1997 to evaluate the use of sandbag enclosures for fragment and blast mitigation, for intentional detonations at Ordnance and Explosives (OE) sites. Southwest Research Institute (SwRI), under contract to USAESCH, performed a two phase test program of sandbag enclosures. In phase one, the preliminary explosive test phase, four tests on a 155-mm projectile were performed to refine and optimize the test procedure. This test procedure was used in phase two, the comprehensive explosive test phase. In phase two, a total of fourteen tests with five different munitions were performed to determine the thickness of sandbags required to capture all primary fragments. Measurements were made of the overpressures at various places, sandbag throw distances, depth of fragment penetration, and noise levels. High-speed film cameras, video recorders and digital cameras were used to visually record the events.

Required Wall and Roof Thicknesses for Sandbag Enclosures, with Expected Sandbag Throw Distances and Pressures, for Five Tested Munitions

Munition	Charge Weight, Comp B, Ib	Required Wall and Roof Sandbag Thickness, in	Expected Maximum Sandbag Throw Distance, ft	Expected Peak Pressure @ 40 feet, psi	Expected Peak Pressure @ 80 feet, psi	Expected Sound Level @ 100 feet, dB
155-mm M107	15.4	36	220	0.18	0.09	115
4.2-in M329A2	8.17 (TNT)	24	125	0.16	0.06	116
105-mm M1	5.08	24	135	0.18	0.08	120
81-mm M374A2	2.1	20	125	0.14	0.05	119
60-mm M49A3	0.43	12	25	0.08	0.03	118

The results of these tests have been used to develop guidelines for the use of sandbag enclosures. The guidelines include required sandbag thicknesses, configuration and construction of the sandbag enclosures, and withdrawal distances based on the greater of sandbag throw distances or 200 ft. This document provides a summary of the test results and these guidelines.

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1.0 Introduction

The U.S. Army Engineering and Support Center, Huntsville (USAESCH) is currently engaged in projects which require the disposal of uncovered/discarded ordnance and explosives (OE) on public and private lands. The uncovered OE item is often detonated in place if it is too dangerous to move. In some cases, covering and tamping with loose earth is used to contain the blast and fragments. Another method to mitigate the fragmentation and blast effects is to cover the item with sandbags. However, traditionally there has been no method to determine the optimum configuration or the required thickness of such a sandbag enclosure.

The Structural Branch, USAESCH, sponsored a test program in 1997 to evaluate the use of sandbag enclosures for fragment and blast mitigation, for intentional detonations at Ordnance and Explosives (OE) sites. Southwest Research Institute (SwRI), under contract to USAESCH, performed a two phase test program of sandbag enclosures. In phase one, the preliminary explosive test phase, four tests on a 155-mm projectile were performed to refine and optimize the test procedure. This test procedure was used in phase two, the comprehensive explosive test phase. In phase two, a total of fourteen tests with five different munitions were performed to determine the thickness of sandbags required to capture all primary fragments. Measurements were made of the overpressures at various places, sandbag throw distances, depth of fragment penetration, and noise levels. High-speed film cameras, video recorders and digital cameras were used to visually record the events.

The results of these tests have been used to develop guidelines for the use of sandbag enclosures. The guidelines include required sandbag thicknesses, configuration and construction of the sandbag enclosures, and withdrawal distances based on the greater of sandbag throw distances or 200 ft. This document provides a summary of the test results and these guidelines.

2.0 Test Program

2.1 Fragmentation Characteristics of Munitions

Prior to beginning this test program the fragmentation characteristics of a variety of munitions frequently encountered during OE site operations were determined. The fragmentation characteristics were calculated in accordance with procedures outlined in TM5-1300, "Structures to Resist the Effects of Accidental Explosions" [1] and detailed in CEHNC-ED-CS-S-98-1, "Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives" [2]. The fragmentation characteristics were used to predict preliminary thicknesses of sand required to prevent perforation for the five munitions tested.

Optimally, the fragments from the munition will strike the sandbags before the blast wave so that the fragments are penetrating undisturbed sand. To ensure that this will occur it is necessary to reduce the coupling between the explosive charge and the

surrounding soil. This coupling is dependent on the separation distance between the charge and the soil. Full coupling implies that the maximum amount of energy, or velocity, is transferred from the explosive into the soil immediately adjacent to the charge. If an explosive charge is placed in a cavity, so that an air gap exists between the charge and the walls of the cavity, coupling between the explosive and soil is reduced. Therefore, a standoff of some distance is required to reduce the coupling effect. Calculations to determine the velocity of sand particles from a buried explosion were performed. The velocity of the sand particles was compared to the velocity of the design fragment through sand. These calculations suggest that at a distance between 6 and 12 inches from the explosion, the fragment velocity exceeds the particle velocity. Therefore, the initial standoff distances for the tests were 6 and 12 inches.

2.2 Preliminary Explosive Test Phase

In the preliminary explosive tests, four tests of statically detonated 155-mm M107 projectiles were performed. These tests provided the data needed to specify the amount and configuration of sandbags that are required to safely detonate a 155-mm projectile in place, verified that the general test procedure was satisfactory, and defined the instrumentation and data acquisition systems for the subsequent comprehensive explosive tests. Figure 1 shows the site layout for the tests of sandbag enclosures. Although, munitions are rarely oriented vertically for demolition in place, the vertical orientation provided the opportunity to evaluate a greater number of combinations of wall thicknesses and standoff distances. Figures 2 and 3 show the sandbag enclosure configurations for vertical and horizontal weapon tests.

The test matrix for the preliminary explosive tests is shown in Table 1. Two tests were run with the 155-mm in the vertical orientation and two in the horizontal orientation. Each test allowed five standoff distances and five sandbag thicknesses to be evaluated.

The sandbags were made of woven polypropylene, as is commonly used by explosives and ordnance disposal (EOD) personnel, and the volume/weight of the sandbags was either 0.5 ft³/50 lbs for the large bags or 0.25 ft³/25 lbs for the small bags. The small bags were used for test two. No additional information was provided by using the small bags so these were not used for any other tests. The bags were filled with a "washed river" sand that was judged to be "typical" by a local soil consultant (Fugro-McClelland Southwest, Inc.).

To determine the sandbag throw distribution some of the sandbags in the first two tests were filled with sand colored with dye. The dye did not improve the quality of the test results. Spray paint was used in the subsequent tests to mark each bag with its original position in the sandbag enclosure. A different color was used to indicate the wall or the roof and numbers were used to indicate the layer in which the sandbag was located.

Detailed descriptions of all tests and results are provided in "Evaluation of Sandbags for Fragment and Blast Mitigation" by Southwest Research Institute [3].

Table 1 – Test Matrix for Preliminary Explosive Tests

Test			Standoff, in.					Wall Thickness, in. (Bag Size)				Wall Height in. (Bag Size)	
No.	Orientation	S ₁	S ₂	S ₃	S ₄	S _R	T ₁	T ₂	T ₃	T ₄ _	H ₁	H ₂	
155-1	Vertical	12	6	6	12	6	32	32.5	45	43	32	20	
155-2	Vertical	6	6	6	6	6	18(s)	54	18(s)	53(s)	32	22	
155-3	Horizontal	6	6	6	6	6	30	48	24	24	12	30	
155-4	Horizontal	6	6	6	6	6	35	36	34	36	12	36	

Note: All walls were constructed with large bags, except for those designated with an "s" for small bags.

2.2.1 Preliminary Explosive Test Results

For tests 1 and 2, the 155-mm M107 projectile was detonated using a donor charge of 200 g of C-4 placed in the fuze well and initiated with an Exploding Bridge Wire. For tests 3 and 4, the 155-mm M107 projectile was detonated using a well perforator shaped charge. This approach is typically used for on-site detonations. Time of arrival (TOA) pins were used for all tests to determine if a high order detonation was achieved.

All detonations were high order and results were obtained. The make screens and their frames and the assorted witness screens were scattered across the site. Where possible, each screen was identified and photographed and the number of fragment holes or the condition of the screen was recorded. The results of the first three tests suggested that a wall and roof thickness of 36 inches should be sufficient to contain all of the fragments and to reduce the overpressure levels. The dimensions of test 4 confirmed this configuration.

From the limited data collected on standoff distance, it appears that for standoffs of 6 and 12 inches there is no difference in the thickness of sandbags required to stop fragments. Test 2 showed that the size of the sandbag did not affect the fragment penetration. Test 3 showed that the horizontal orientation of the munition did not greatly effect the fragment penetration. Tests 3 and 4 showed that the base plate of the munition broke up and was stopped by 24 inches or less of sandbags.

The data collected showed that approximately 20 inches of sandbags will completely contain the fragments from the 155-mm M107 projectile. The only indications of fragments exiting the sandbag enclosure came from the two identical 18 inch walls of test 2 (external witness screens on sides 1 and 3 both registered fragment impacts). Internal witness screens at depths of 20 inches to 24 inches for all 4 tests did not indicate any fragment impacts. In tests 2 through 4, the roof witness screens also showed no penetrations for 20 to 36 inches of roof depth. The CONWEP software [4] predicts that 24 inches of sand will stop the design fragment from the 155-mm M107 projectile.

Sandbag throw distances were recorded in 10 foot increments from ground zero to the furthest sandbags. The maximum sandbag throw distances were 150 feet, 191 feet,

157 feet, and 150 feet for tests 1 through 4, respectively. All of the furthest thrown sandbags came from the roof. In most cases, the roof sandbags were found relatively intact while the wall sandbags were often disintegrated. The bulk of the sandbags fell within 100 feet with only a few beyond this distance. An examination of the sandbag throw distances show that the standoff, the size of the bag, and the weapon orientation did not affect the throw distance to any significant degree.

Blast overpressures were recorded for all 4 tests (see Table 2). As shown, the sandbag enclosures greatly reduced the magnitude of the pressure. In test 3, a digital sound meter was placed 100 feet from ground zero and the maximum sound level recorded was 114.7 decibels.

Table 2 – Blast Overpressures from Preliminary Explosive Tests

		Sid	le 1		Side 4				
Test No.	P1 @ 40', psi	P2 @ 40', psi	P3 @ 80', psi	P4 @ 80', psi	P5 @ 40', psi	P6 @ 40', psi	P7 @ 80', psi	P8 @ 80', psi	
155-1	0.67	0.71	ND	ND	0.37	0.38	ND	ND	
155-2	1.31	1.18	ND	ND	0.74	0.97	ND	ND	
155-3	0.16	0.16	0.07	0.06	0.16	0.18	0.09	ND	
155-4	0.04	0.04	0.03	0.03	0.07	0.08	ND	0.05	

ND = no data

2.3 Comprehensive Explosive Tests

An additional fourteen tests were performed: one more using 155-mm M107 projectiles, four using 105-mm M1 projectiles, three using 4.2-in M329A2 projectiles, four using 81-mm M374A2 mortars, and two using 60-mm M49A3 mortars. The test matrix for the comprehensive explosive tests is shown in Table 3. For all tests performed with the munition in the vertical orientation, detonation was achieved using a donor charge of 100 grams (50 grams for test 60-1) of C-4 in the fuze well. For all tests performed with the munition in the horizontal orientation, detonation was achieved using a well perforator. TOA pins were used for all tests to check if a high order detonation was achieved.

For each of the comprehensive explosive tests, woven polypropylene 0.5 ft³ sandbags were filled with 50 lbs of washed river sand. The sandbags were painted and numbered as described in Section 2.2 to indicate their original position in the sandbag enclosure. Moisture content was not controlled nor monitored during the test program.

Pressure gages, a sound meter, high speed cameras, digital cameras and video cameras were used for data acquisition during each test. Internal and external witness screens were used to determine how deeply the fragments moved into the sandbag mass and whether any fragments exited the sandbag enclosure.

Table 3 – Test Matrix for Comprehensive Explosive Tests

											Wall F	leight,	
Test			Standoff, in.					Wall Thickness, in.				in.	
No.	Orientation	S ₁	S ₂	S ₃	S ₄	S _R	T ₁	T ₂	T ₃	T ₄	H ₁	H ₂	
155-5	Horizontal	7	7	5	6	7	36	36	36	36	13	36	
4.2-1	Vertical	5.5	5.5	5.5	5.5	6	20	24	31	36	19	24	
4.2-2	Horizontal	6.5	6.5	6	6	7	24	25	24	24	11	24	
4.2-3	Horizontal	6	5	5	6	7	24	25	25	24	11_	24	
105-1	Vertical	5.5	5.5	5.5	5.5	6	20	26	31	35	25	24	
105-2	Vertical	0	0	4	6	6	29	25	19	25	26	23	
105-3	Horizontal	7	5	5	5	9	24	24	24	24	13	24	
105-4	Horizontal	6.5	6	5	6	7	25	25	24	24	11_	23	
81-1	Vertical	5	5	6	6	6	12	19	23	30	15	18	
81-2	Horizontal	7	6	5.5	7	6	18	24	18	24	9	18	
81-3	Horizontal	7	6	5	6	7	18	19	18	19	10	18	
81-4	Horizontal	6	5.5	5.5	5.5	8	19	20	19	20	11	18	
60-1	Vertical	6	6	6	6	6	13	19	23	30	11	12	
60-2	Horizontal	6.5	3	5.5	3	6	12	12	12	12	8	13	

All detonations were high order and results were obtained. The assorted witness screens were scattered across the site. Where possible, each screen was identified and photographed and the number of fragment holes or the condition of the screen was recorded. Sandbag throw distances were recorded in 10 foot increments from ground zero to the furthest sandbags. Blast overpressures were recorded for all tests at 40 feet and 80 feet from ground zero. A digital sound meter was placed 100 feet from ground zero. A summary of the results is shown in Table 4.

The final test for each munition was a confirmation test. These included tests 155-5, 4.2-3, 105-4, 81-3 and 60-2. The purpose of the confirmation tests was to model as closely as possible the actual use of sandbags in field conditions. In each test the internal witness screens were omitted. Sandbags were staggered both horizontally and vertically. External witness screens were placed over the roof and the two sides facing away from the pressure gages. After each test, the external witness screens were recovered and inspected for fragment penetrations. No such penetrations were identified. Therefore, the sandbag thicknesses defined in Table 4 are those used in the confirmation tests. For two munitions, the penetration data from internal witness panels suggests that somewhat smaller sandbag thicknesses may be sufficient to capture all fragments. As stated above for the 155-mm M107, internal witness screens show no fragment penetrations for sandbag thicknesses of about 24 inches or more. For the 4.2inch M329A2 mortar, the internal witness screens show no fragment penetrations deeper than about 18 inches. However, the thicknesses of 36 inches for the 155-mm M107 and 24 inches for the 4.2-inch M329A2 are retained for use in the field, since sandbag throw distances are based on these thicknesses. While possibly thicker than necessary from capturing fragments, the increased total mass of the sandbags results in reduced sandbag throw distances.

Detailed descriptions of all tests and results are provided in "Evaluation of Sandbags for Fragment and Blast Mitigation" by Southwest Research Institute [3].

3.0 Guidelines for Use of Sandbags

3.1 Enclosure Geometry

Table 5 summarizes the results of the tests. This table specifies the minimum thickness of sandbag walls and roof that is needed to completely contain the fragments for the five munitions that were tested in this project. It also gives the expected maximum sandbag throw distances, the peak pressures at 40 feet and 80 feet, and the sound level at 100 feet, for the five munitions. For safety and conservatism, the expected sandbag throw distances are approximately 10% larger than the largest distances actually measured in the tests. Thus, the expected sandbag throw distances given in Table 5 are conservative in two ways: first, the largest measured sandbag throw distance from all tests of a particular round is used and second, this value is increased by 10%. Due to the already low values of peak pressures, a similar increase in the expected peak pressures was not deemed necessary or justified.

Table 4 – Summary of Results from Comprehensive Explosive Tests

Table 4 – Summary of Results from Complehensive Explosive Tests									
	Sandbag			Max	Peak	Max	Peak	Max	
ł	Thickness		dbag Throw	Overpres	sure (psi)	Overpres	Noise		
	(in) to	Dista	nce (ft)	@ 4	40 ft	@ 8	30 ft	Level	
	Defeat	Side of	Nose/Tail	Side of	Nose of	Side of	Nose of	(dB) at	
Munition	Fragments	Round	of Round	Round	Round	Round	Round	100 ft	
155-mm M107	36	200	130	0.06	0.12	0.04	0.05	114.7	
4.2-in M329A2	24	110	70	0.12	0.14	0.04	0.06	115.8	
105-mm M1	24	120	50	0.17	0.18	0.07	0.08	119.3	
81-mm M374A1	20	110	30	0.14	0.08	0.05	0.03	118.3	
60-mm M49A3	12	20	20	0.06	0.08	0.02	0.03	117.3	

Obviously, the five munition types do not cover all of the munitions that may be encountered. To determine the minimum wall and roof thickness for a particular shell other than those found in Table 5, the approach is as follows:

- (1) Determine the initial fragment velocity (V_F) in ft/s, the maximum fragment weight (W_F) in pounds, and the kinetic energy (W_FV_F²/2) in lb-ft²/s² for the particular munition.
- (2) Identify the munition with the next largest kinetic energy, from Table 6.

(3) Use the sandbag wall and roof thickness from Table 5 for the munition with the next largest kinetic energy shown in Table 6.

Table 6 provides the maximum fragment weight, the initial fragment velocity, and the resulting kinetic energy for the 5 munition types. The maximum fragment weight and the initial fragment velocity values were determined with the Mott and Gurney equations, as presented in TM 5-1300 [1] and detailed in HNC-ED-CS-S-98-1 [2].

Table 5 - Required Wall and Roof Thicknesses for Sandbag Enclosures, with Expected Sandbag Throw Distances and Pressures, for Five Tested Munitions

Sandbag Thow Distances and Pressures, for rive Tested Munitions									
Munition	Charge Weight, Comp B, lb	Required Wall and Roof Sandbag Thickness, in	Expected Maximum Sandbag Throw Distance, ft	Expected Peak Pressure @ 40 feet, psi	Expected Peak Pressure @ 80 feet, psi	Expected Sound Level @ 100 feet, dB			
155-mm M107	15.4	36	220	0.18	0.09	115			
4.2-in M329A2	8.17 (TNT)	24	125	0.16	0.06	116			
105-mm M1	5.08	24	135	0.18	0.08	120			
81-mm M374A2	2.1	20	125	0.14	0.05	119			
60-mm M49A3	0.43	12	25	0.05	0.03	118			

Table 6 - Maximum Fragment Weight, Initial Fragment Velocity and Kinetic Energy for Five Tested Munitions

Munition	W _F , Maximum Fragment Weight, Ib	V _F , Initial Fragment Velocity, ft/s	Kinetic Energy, 10 ⁶ lb-ft ² /s ²
155-mm M107	0.467	4667	5.085
4.2-in M329A2	0.079	6391	1.613
105-mm M1	0.155	4870	1.868
81-mm M374A2	0.031	6721	0.700
60-mm M49A3	0.033	3605	0.214

As an example, for a shell such as the 3-in Stokes Mortar Round, the maximum fragment weight and initial fragment velocity are 0.0436 lb and 6189 ft/s, respectively. The resulting kinetic energy is 0.835×10^6 lb-ft²/s². The next largest fragment kinetic energy in Table 6 is the 4.2-in M329A2 round. Therefore, a sandbag enclosure with a roof and wall thicknesses of 24 inches should be used to contain the fragments and suppress the blast overpressures. The maximum sandbag throw distance is 125 ft. Therefore, the withdrawal distance is 200 ft.

Based on this procedure, a more complete list of typical munitions is given in Table 7. This table includes the required sandbag wall and roof thicknesses and maximum expected sandbag throw distances to be used for each munition. For other munitions not listed in Table 7, the procedure given above can be used. The procedure should not be used to extrapolate sandbag thicknesses or sandbag throw distances for munitions larger than the 155-mm M107.

3.2 Enclosure Construction Method

The enclosure construction method follows the procedure that was used to build the test enclosures, with a few modifications. Figure 4 illustrates a typical enclosure. Figure 5 shows a photograph of a sandbag enclosure for an 81 mm mortar.

The sandbag fabric should be woven polypropylene. Each bag should have a nominal volume of 0.5 ft³ and an approximate weight when full of 50 lb. The bags should be filled with washed sand, either dry or in saturated surface dry (that is, slightly moist) condition. Wet sand should not be used. Prefilled sandbags should be protected from the rain by storage on pallets, off the ground surface, and by covering them with a plastic tarpaulin or similar cover to prevent them from becoming saturated with water. The gradations and physical composition of the sand are not critical but it should be at least typical of local construction practice for sand used in foundations and backfill. Minor inclusions of clay or soils materials can be permitted. However, no rocks or stones should be placed in the sandbags. Typically, the sand used for the tests had a density of about 100 pounds per cubic foot and a moisture content of 6-7%.

Four walls of identical thickness should surround the munition. The minimum wall thickness should be the thickness determined using the procedure in Section 3.1 above. The sandbag walls should be stacked to maintain a clear standoff distance of 6 inches between the shell and the inside face of each wall. The interior face of each wall should be vertical but the exterior face can be built with a 1:6 slope (2" horizontal to 12" vertical). If a sloped outer face is used, the thickness of the wall, at the nominal "top" of the wall, 6 inches above the top of the munition, must be no less than the specified required thickness

The sandbags should be placed tightly against each other. All vertical joints should be staggered, so there is no clear line of sight from the munition to the exterior. As the wall is built, each new layer of sandbags should run in opposite direction to the layer below, so that the layers are interlocked (see Figure 6).

At a minimum, a double layer of sandbags shall be used. For example, when a 12" thickness is required, the sandbags should be oriented so that two sandbags are necessary to achieve this thickness (see Figure 7).

After the walls are constructed to a height of 6" above the upper surface of the munition, the shaped charge or other initiator should be placed on the shell. Ideally, the use of shaped charges, such as oil well perforators, is recommended. These add very little to the total charge weight for each detonation, given the highly directional nature of the effects of the shaped charge. Also, the use of shaped charges for initiation parallels test procedures. The shaped charge should be located either on top of the munition or on its side. If it is located on the side of the round, the charge should be tilted downward sufficiently to ensure that the shaped charge jet penetrates the round and is directed into the ground, rather than into the opposite sandbag wall. Generally, a small mound of sand next to the round can be used to establish this orientation.

A sheet of 3/4-inch thick Douglas Fir (or equivalent) plywood should be cut to the dimensions of the cavity between the walls, plus 12 inches in each direction. The plywood sheet is then centered on the walls so that it bears on 6" of each wall. The additional sandbags that make up the roof of the enclosure are then placed on top. As with the side walls, the roof sandbags should be stacked with staggered horizontal joints and alternating directions in each layer. The exterior sides of the roof may also be vertical or have a 1:6 slope. The thickness of the sandbag roof, above the plywood panel, must be the same as the required wall thickness.

After the sandbag layers of the roof have been placed to the correct height, the enclosure is complete and the munition may be detonated.

Table 7 - Required Wall and Roof Thicknesses for Sandbag Enclosures, with Expected Sandbag Throw Distances and Pressures, for Tested and Non-Tested Munitions

Sandbag IIII	OW DISIA	nces and r	essures, it	i resteu e	Υ		
					Required Wall and	Expected Maximum	
		W _F ,	V _F , Initial	Kinetic	Roof	Sandbag	With-
	Charge		Fragment	Energy,	Sandbag	Throw	drawal
	Weight	Fragment	Velocity,	10 ⁶ lb-	Thickness,	Distance,	Distance,
Munition	(lb)	Weight, Ib	ft/s	ft ² /s ²	in	ft	ft
155mm M107*	15.48	0.467	4667	5.086	36	220	220
4.7-in Mark I	6.07	0.591	3566	3.761	36	220	220
105mm M1*	5.08	0.155	4870	1.840	24	135	200
4.2-in M329A2*	8.165	0.079	6391	1.607	24	125	200
4-in Stokes	7.92	0.078	6336	1.570	24	125	200
75mm M48	1.47	0.153	3471	0.922	24	125	200
3-in Stokes	2.1	0.044	6189	0.835	24	125	200
2.75-in M229 Rocket	4.8	0.050	5569	0.777	24	125	200
81mm M374*	2.1	0.031	6721	0.696	20	125	200
37mm MK II	0.53	0.030	5758	0.490	20	125	200
60mm M49A3*	0.42	0.024	5114	0.310	12	25	200
FMU 54A/B	0.357	0.006	9031	0.263	12	25	200
40mm MK2 Mod 0	0.187	0.033	3605	0.215	12	25	200
MK II Grenade	0.125	0.014	3425	0.083	12	25	200
25mm M792	0.096	0.005	5736	0.081	12	25	200
M67 Grenade	0.40625	0.001	7006	0.029	12	25	200
20mm M56A4	0.0264	0.0000011	4941	0.004	12	25	200

^{* =} tested munitions

3.3 Withdrawal Zone

A withdrawal zone is necessary for any detonation. This withdrawal zone applies to everyone, both public and operational personnel. The withdrawal zone is the maximum of the sandbag throw distance, the distance to a sound level of 140 db, or 200 ft. For all munitions tested, the sound level at 100 ft was substantially less than 140 db. At 200 ft. the sound level will be even lower. The withdrawal zones are also listed in Table 7.

4.0 Summary and Conclusions

A test program has been performed to determine the effects of sandbag enclosures for mitigating fragments and blast effects due to an intentional detonation of a munition. A total of eighteen tests on five different munitions were performed. A summary of the test procedures and results are presented in this document.

The results of these tests have been used to develop guidelines for the use of sandbag enclosures to mitigate the fragments and blast effects due to an intentional detonation of a munition. Methods for determining the required sandbag thickness and the resulting sandbag throw distance are detailed in Section 3.0. Figures 4, 5, 6 and 7 show the resulting sandbag enclosures.

5.0 References

- 1. TM5-1300, "Structures to Resist the Effects of Accidental Explosions", Departments of the Army, the Navy, and the Air Force, November 1990.
- 2. HNC-ED-CS-S-98-1, "Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives", M. Crull, U.S. Army Engineering and Support Center, Huntsville, January 1998.
- 3. "Evaluation of Sandbags for Fragment and Blast Mitigation", D. Stevens, Southwest Research Institute, San Antonio, TX, January 1998.
- "User's Guide for Microcomputer Programs CONWEP and FUNPRO Applications of TM 5-855-1. "Fundamentals of Protective Design For Conventional Weapons"", Revision 2, D. Hyde, US Army Corps of Engineers Waterways Experiment Station, February 1989.

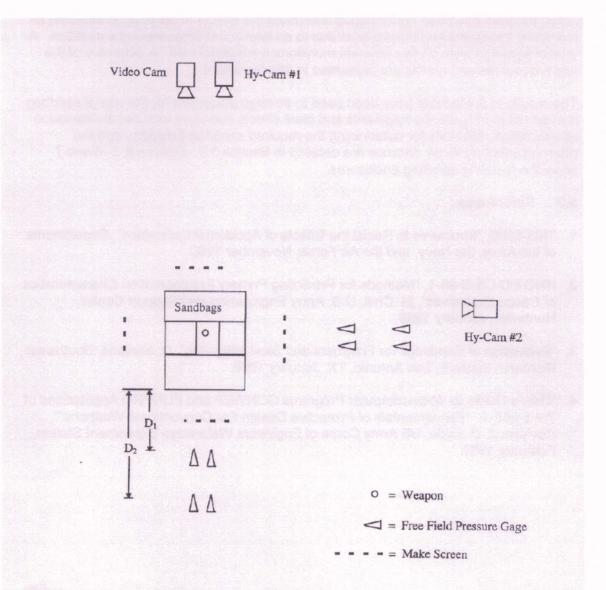


Figure 1 – Site Layout for Tests of Sandbag Enclosures

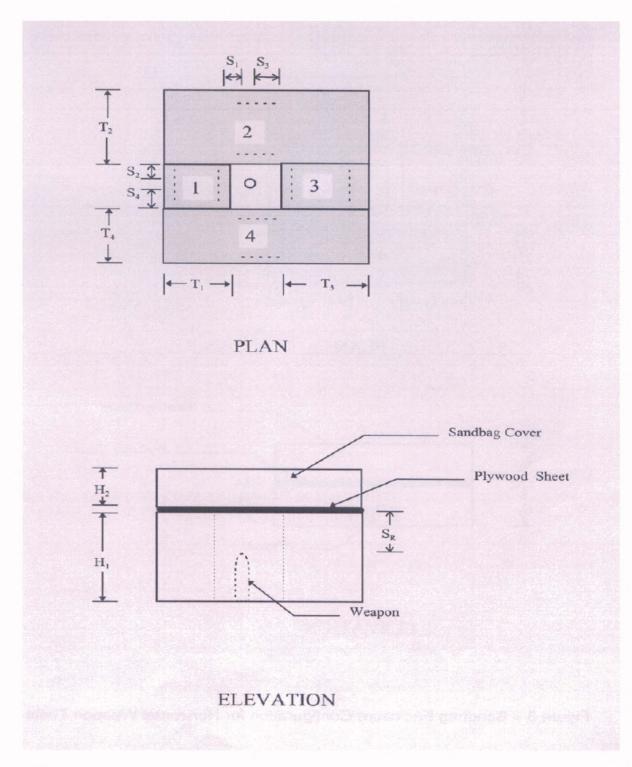


Figure 2 – Sandbag Enclosure Configuration for Vertical Weapon Tests

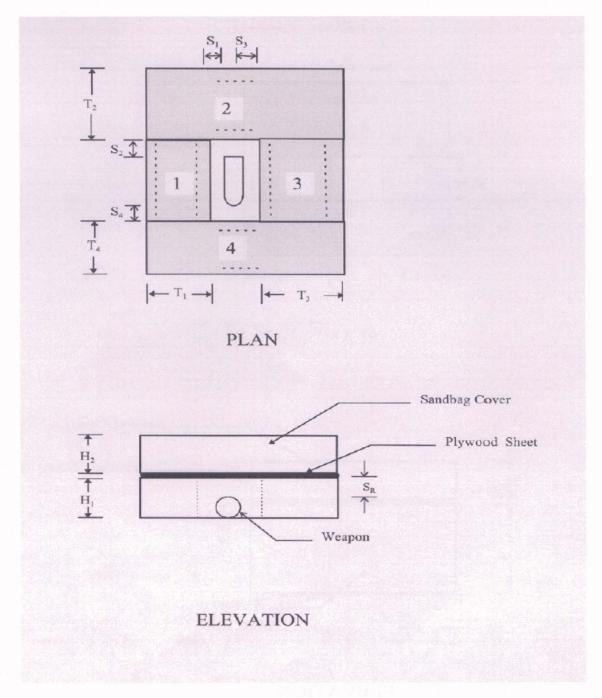
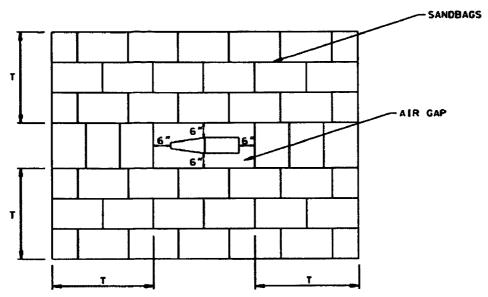
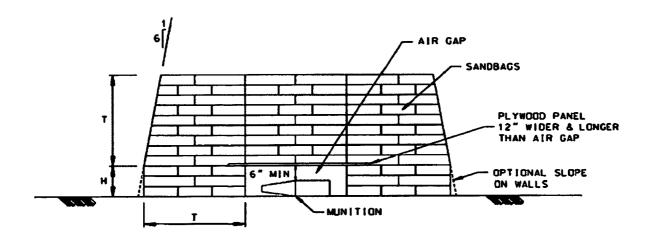


Figure 3 – Sandbag Enclosure Configuration for Horizontal Weapon Tests



T=THICKNESS OF SANDBAGS REQUIRED FOR SPECIFIC MUNITION

PLAN VIEW AT ELEVATION H SANDBAG ENCLOSURE



SIDE SECTION VIEW SANDBAG ENCLOSURE

Figure 4 - Typical Sandbag Enclosure



Figure 5 – Sandbag Enclosure for an 81 mm M374A2 mortar.

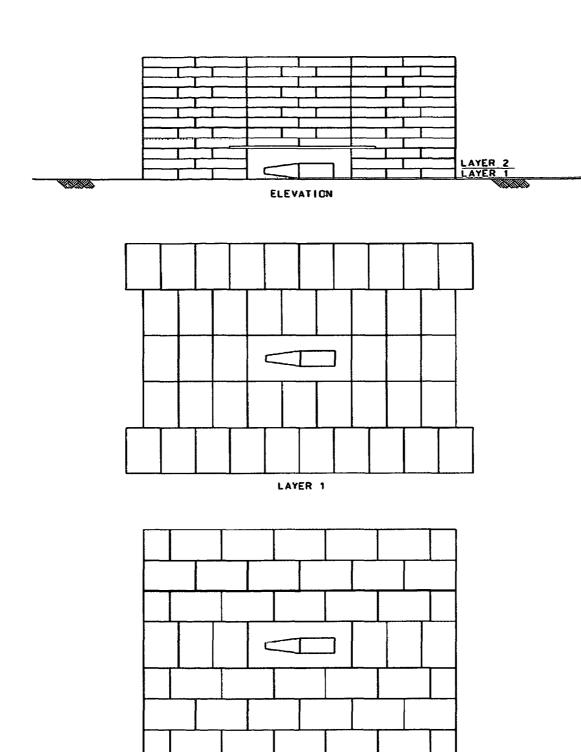


Figure 6 - Interlocking Alternate Layers of Sandbags

LAYER 2

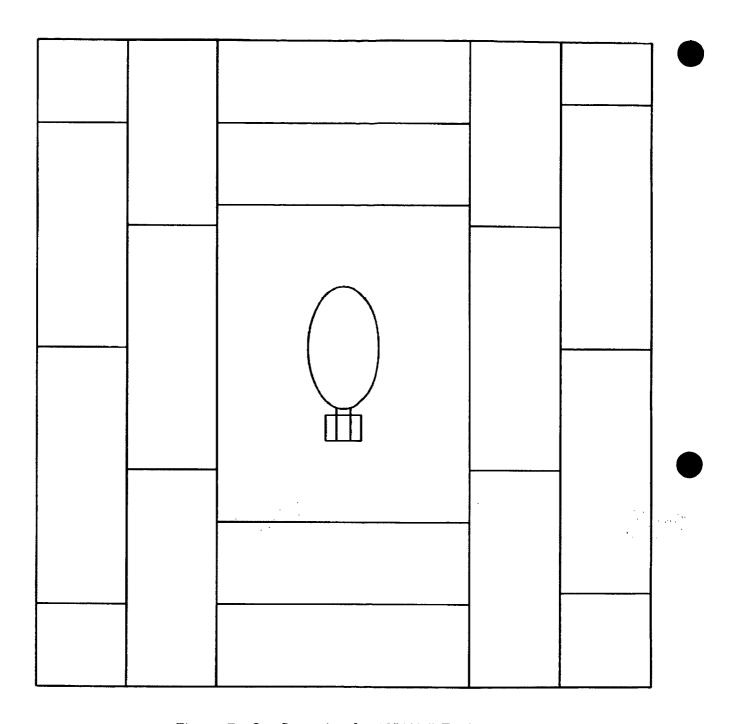


Figure 7 - Configuration for 12" Wall Enclosures

APPENDIX K SCOPE OF SERVICES

Bhate Project Number: 9030080

June 2006

Appendix K

SCOPE OF WORK

MUNITIONS RESPONSE ACTIONS TO SUPPORT GEOTEXTILE INSTALLATION AT

THE OLD DUPONT DISPOSAL AREA, CHEATHAM ANNEX, WPNSTA YORKTOWN,

December 5, 2005

1.1 Yorktown, Virginia

The Action Memorandum for Site 7 – Old Dupont Disposal Area (U. S. Navy, 2004) described the TCRA. The proposed TCRA at Site 7 addresses only shoreline stabilization. The eastern slope of the disposal area along the York River will be stabilized to prevent further erosion of the disposal area contents into the York River. Shoreline stabilization will include the installation of sand-filled geotextile tubes. The geotextile tubes will be placed against the toe of the eroding slope and will protect approximately 240 feet of the shoreline. Figure 1-2 shows the extent of the shoreline to be protected which encompasses the area of debris south of Cabin 169 and extends to the northern boundary of Cabin 170.

The design specifications and drawings, developed by Baker Environmental, Inc. (Baker), for the placement of the geotextile tubes were provided by NAVFAC Mid-Atlantic to Bhate (Appendix A). The design specifications and drawings document is broken down into the following components:

- Site Preparation
- Waste Disposal
- Stabilization of the Existing Slope
- Installation of the Geotextile Tubes and Scour Aprons
- Filling of the Geotextile Tubes and Scour Aprons
- Backfilling around the Geotextile Tubes and Scour Aprons
- Site Restoration
- Standards and Specifications
- Submittals
- Performance

The excavated waste and debris will be transported to and disposed at a Navy-approved off-site Resource Conservation and Recovery Act (RCRA) Subtitle D landfill. Metal and woody debris will be recycled, if possible.

Based on preliminary results conducted during sampling activities, the landfill material is assumed to be non-hazardous (Baker, 2004). The management and disposal of hazardous waste is not anticipated and, therefore, is not included in the project specifications.

On 9 June 2004, a 3-inch diameter projectile was found on the beach of the York River, below Site 7. The projectile was removed from the site and disposed of by Naval Weapons Station Yorktown Explosive Ordnance Disposal Mobile Unit Two (EODMUTWO). The projectile was severely corroded and appeared to be unfired and unfuzed. Evidence following disposal procedures was inconclusive as to whether the projectile was explosive or inert filled. The origin of this single item is unknown.

In order to accommodate installation of the geotextile tube and scour apron, all debris must be removed from the upland area of Site 7 to an approximate depth of one foot. For safety reasons, all munitions of explosive concern (MEC) must be removed from the site to the same depth.

The Scope of Work, Munitions Response Actions to Support Geotextile Installation at the Old Dupont Disposal Area, Cheatham Annex, WPNSTA Yorktown, Yorktown, Virginia (U. S. Navy, 2005) describes the munitions response actions. A MEC removal action will be performed in accordance with an approved Explosives Safety Submission (ESS) in the area where the geotextile tubes will be installed. The total area of the MEC removal action includes two distinct areas. The area where the geotextile tube will be installed is from the toe of the slope of the embankment to about ten feet from the high tide line and approximately 250 feet long +/- 40 feet. This area is referred to as the upland area. The second area where the scour apron will be installed extends ten feet from the high tide line to about 25 feet east towards the York River and also approximately 250 feet long +/- 40 feet. This area is referred to as the shoreline area. The scope of work includes the following four tasks:

- Munitions response in the upland area
- Munitions response in the shoreline area
- Explosives Safety Submission preparation (submitted under separate cover)
- Update the work plan

The ESS was prepared in accordance with Naval Ordnance Safety and Security Activity (NOSSA) Instruction 8020.15. An ESS is required before conducting ground disturbance or intrusive activities in areas known or suspected to contain munitions and explosives of concern (MEC). The ESS is a planning document for conventional ordnance and explosives (OE) response actions and provides the safety specifications for execution of the selected response alternative. The ESS is a separate submittal from this work plan, however, an overview of the operational approach for the OE response action are described herein. The final ESS was prepared and submitted to NAVFAC Mid-Atlantic and approved by NOSSA in December 2005

(Bhate, 2005). In addition, an Unexploded Ordnance (UXO) Work Plan is being prepared and submitted under a separate cover.

The proposed TCRA (Navy, 2004) and the design specifications and drawings (Appendix A) included the stabilization of the existing slope and placement of a geotextile/geomembrane on the slope. Due to the lack of available funding, these items were removed from Bhate's scope of work.